Initial Environmental Examination

August 2021

Tajikistan: Climate and Disaster Resilient Irrigation and Drainage Modernization in the Vakhsh River Basin Project

Prepared by the Agency of Land Reclamation and Irrigation for the Asian Development Bank.

CURRENCY EQUIVALENTS[1]

(as of 1 August 2021)

Currency unit	–	Tajik Somoni
Tajik Somoni 1.00	=	$0.0886
$1.00	=	11.289 Tajik Somoni

ABBREVIATIONS

ADB	Asian Development Bank
AAP	Asbestos Abatement Plan
AIR	Asbestos Investigation Report
ALRI	Agency of Land Reclamation and Irrigation
AMP	Asbestos Management Plan
ACM	Asbestos Containing Material
CEP	Committee for Environmental Protection
CLO	Community Liaison Officer
EHS Guidelines	World Bank Group's Environmental, Health and Safety Guidelines
EMP	Environmental management plan
ESO	Environmental Safeguards Officer
GDP	Gross domestic product
GRM	Grievance Redress Mechanism
GOT	Government of the Republic of Tajikistan
HSO	Health and Safety Officer
IEE	Initial Environmental Examination
IES	International Environmental Specialist (including asbestos management)
ISH	Sanitary Inspectorate of the Ministry of Health
ISI	Industrial Safety Inspectorate
IWRM	Integrated water resources management
LARP	Land Acquisition and Resettlement Plan
LRID	ALRI's district Land Reclamation and Irrigation Division
MEWR	Ministry of Energy and Water Resources
NES	National Environmental Specialist
NGO	Non-governmental organization
O&M	Operation and maintenance
OHS	Occupational health and safety
PIC	Project Implementation Consultant
PIG	Project Implementation Group
PIG-ES	PIG's environmental specialist
PPE	Personal protective equipment
REA	Rapid environmental assessment
SCADA	Control and Data collection system
SEE	State environmental expertise
SPS	Safeguard Policy Statement
SSEMP	Specific Site Environmental Management Plan
WUA	Water Users Association

[1] Foreign Exchange (adb.org)

WEIGHTS AND MEASURES

Ha	–	hectare
Km	–	kilometer
M	–	meter

GLOSSARY

Dehkan farm	-	A small family enterprise that produces and sells agricultural products using the labor of family members on a land plot transferred to the head of the family as inherited property throughout life, is officially registered or not as a legal entity.
Hukumat	-	State administrative office at the regional and district levels
Jamoat	-	State administrative union at the village level. A small piece of land next to the house and used for agriculture / horticulture
Mahala	-	Traditional community structure, local district council
Oblast	-	Administrative division or region in the constituent republics of the former Soviet Union (e.g. Tajikistan).
Qyshloq	-	Village administrative division
Rayon (nohiya)	-	District (Russian version)
Plot	-	Household plot of land for agricultural activities
Salinization	-	High salinity in the soil and / or water, threatening plant growth, also called mineralization

NOTES

In this report, "$" refers to US dollars.

Table of Contents

List of Figures

List of Tables

Executive Summary

1. The Government of the Republic of Tajikistan (GOT) has requested the Asian Development Bank (ADB) to provide financing to facilitate modernization of the irrigation and drainage (I&D) system in the Vakhsh River basin. This document is the Initial Environmental Examination (IEE) for the development of infrastructure in an initial area of 40,355 ha of the Yovon system in the Yovon and Khuroson valleys (**Figure 0-1**). This will be Phase 1 of the Irrigation and Drainage Modernization in the Vakhsh River Basin project (hereinafter referred to as "the Project").

2. **The Project.** The financing is proposed to support upgrading of the I&D infrastructure and institutional support grouped under five project component activities: (i) Infrastructure, (ii) Institutional Development for Improved and Financially Sustainable Operations and Maintenance, (iii) Agriculture Development, (iv) Social and Gender Development, and (v) Climate Smart Adaptation Measures.

3. The Project is located in the Khatlon Province of the lower Vakhsh river basin and covers an area of 9,827 hectare (ha).[2] It will boost climate and disaster resilience, water productivity,[3] income of farmers, efficient water management and farming practices in selected areas of the Yovon I&D Scheme. The Project will introduce for the first time in Tajikistan (i) climate and disaster resilient modernization[4] of prioritized infrastructure; (ii) streamlined institutions and systems for effective planning, operation and maintenance (O&M); and (iii) policies and strategies to addresses gender equality and enhance women's participation in land and water management. Some 9,600 farmers, of whom 20% are female, will benefit from improved water service delivery, energy savings and application of climate smart technologies.[5] This IEE primarily discusses the proposals for the upgrading of the Project's system under the first Output of modernization.

4. Preliminary technical and economic studies commissioned by Agency of Land Reclamation and Irrigation (ALRI), the executing agency of the Project, broadly established the requirements for the modernization of the Project's system in the Yovon area. Subsequently ADB's Technical Assistance (TA)[6] has included more detailed analysis and environmental assessment of the proposals for Phase 1 implementation of the Project's Yovon system modernization.

5. The study area is in the Khatlon region where most crop production is carried out using irrigated agriculture that increases productivity of reclaimed lands in such arid regions. The project will increase irrigation efficiency and the technical skills of men and women farmers, support improved farm practices, adoption of gated pipe for furrow irrigation, mechanized farming, efficient irrigation systems for homestead irrigation, and input sourcing and marketing (value chain) infrastructure.

6. The study area land is inclined towards two rivers in the distinct valleys of Khuroson and Yovon with slopes increasing from < 1% in the valley bases up to 3.2% towards the hills. Land elevations vary from +450m above sea level in the south of the Khuroson valley to about +850m above sea level at the head of the Yovon valley. Soils comprise wind-blown, pale yellow/ light brown loess about 150-300m deep which is highly susceptible to erosion and deep gullies have formed within the study area.

7. The study area is arid with rain mainly from November to May and frosts from December to

[2] The project was prepared under technical assistance TA-9867 TAJ. ADB.2019. *"Preparing the Irrigation and Drainage Modernization in the Vaksh River Basin Project".* Manila.

[3] Water productivity (commonly referred to as crop per drop) involves increasing crop yields or reducing crop water use. It is measured in terms of crop yield (kilogram) or value ($) per unit of water consumed.

[4] Modernization involves upgrading infrastructure, operations and management of irrigation systems to sustain the water delivery service requirements of farmers and optimize production and water productivity. ADB. 2017. *Irrigation Subsector Guidance Note: Building Blocks for Sustainable Investment*. Manila.

[5] The new technologies introduced by the project include: (i) acquisition of real-time data for irrigation scheduling; (ii) remotely operated flow control and monitoring systems; and (iii) transparent cashless payment for irrigation services.

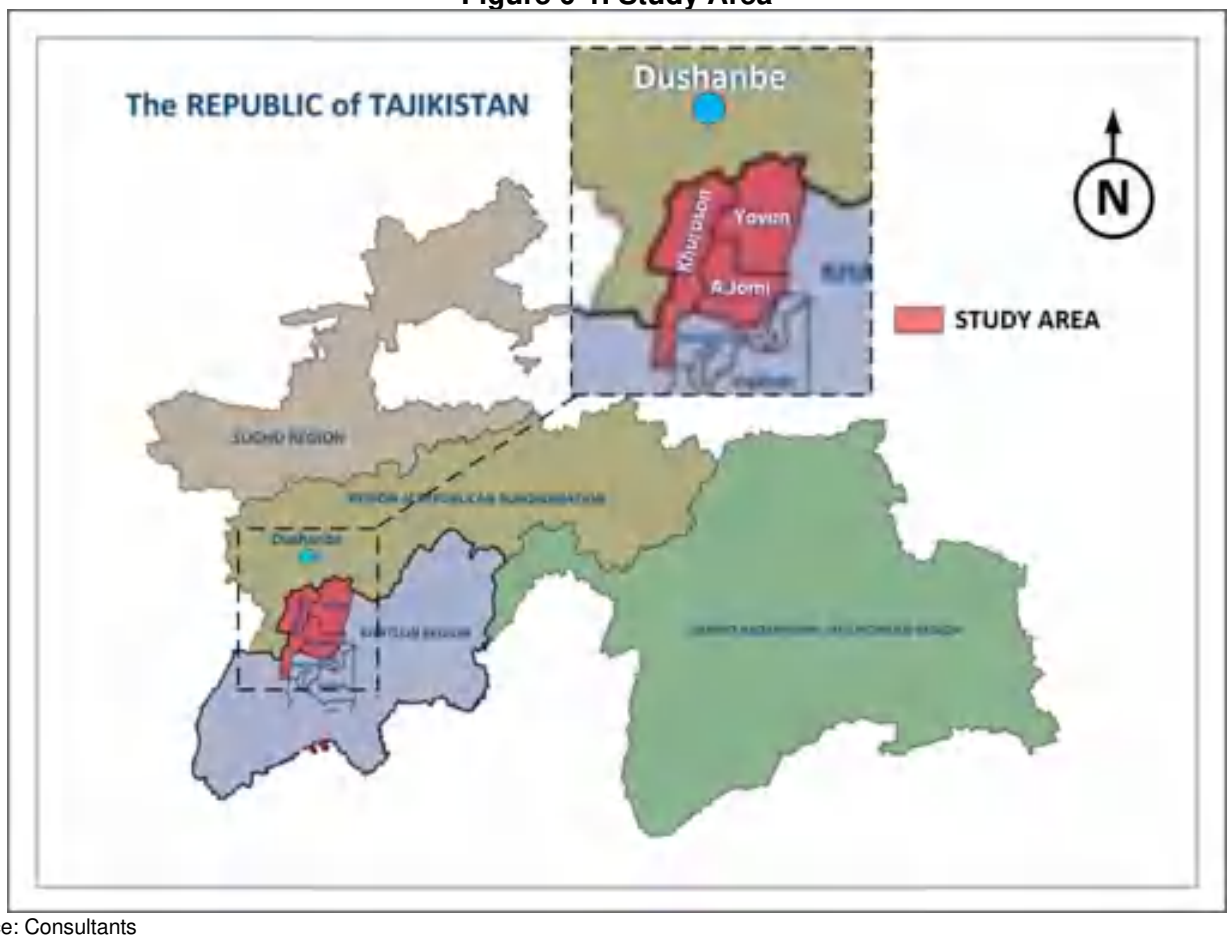
[6] The project was prepared under technical assistance TA-9867 TAJ. ADB.2019. *"Preparing the Irrigation and Drainage Modernization in the Vaksh River Basin Project".* Manila.

March. Minimum average temperatures are above freezing from March to November with highs of 37 ℃ in July. Humidity is typically just 45-60% from April to late September. Groundwater is saline and following development of the original irrigation scheme in the 1960s the water table rose quickly from -20m to within 2m of ground surface.

8. The existing I&D system will be cleaned repaired and upgraded wherever possible with replacement pipes and connections where old equipment is no longer serviceable. The supporting infrastructure and associated feeder canals and water supplies have been in place since the 1960s and 1970s. Some of the cement irrigation supply and drainage pipes are known to contain asbestos. Irrigation water supply, drainage and canal systems are known to be deteriorating due to environmental factors and lack of maintenance and will require repairs, replacement, and maintenance to avoid further deterioration. Therefore this IEE covers both environmental and asbestos management for the proposed physical interventions.

9. Subsequent to missions and due diligence carried out by ADB in 2020/21, this IEE covers the physical proposals for an irrigable command area of 40,355ha (59% gravity feed and 41% pumped) in Yovon. The Yovon scheme engineering infrastructure comprises: (i) Main-Branch Canals and associated structures, (ii) Pumping Systems, (iii) Secondary-Tertiary Distribution Systems, (iv) Drainage Systems, (v) Escape/ spill mudflow channels, (vi) Inspection and Farm Roads, and (vii) Field systems. ALRI manages, operates and maintains the main system of branch canals, spill/escape channels, pumping stations and collector drains. Seventeen water user associations (WUAs) are responsible for management, operation, and maintenance (MOM) of secondary and tertiary systems, including the buried (asbestos) pipe systems, in their respective areas. **Figure 0-1** shows the study area.

Figure 0-1. Study Area



Source: Consultants

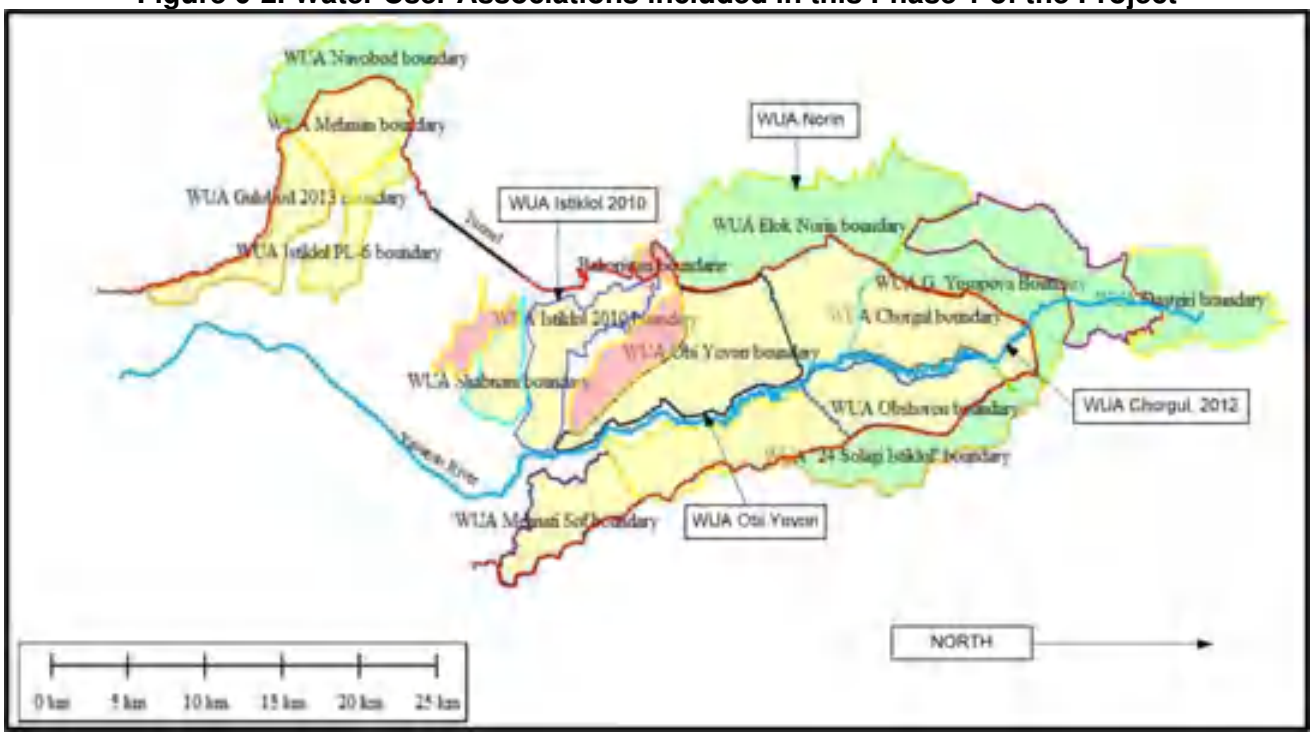
10. Supplementary irrigation is required to improve agricultural yields. The irrigation mainly takes place in the growing season from April to September and crops include cotton, corn, vegetables, cucurbits, orchards, vines, and fodder. Winter wheat is sown in the autumn and harvested in April or May.

11. This IEE covers Phase 1 of the development project, proposed to be funded by ADB grant. The IEE study was carried out in the area around Yovon and included interaction with authorities, community, and farmers in the adjacent rural area. This Phase 1 IEE assesses proposed works under the following activities (i) repairs, upgrading, and maintenance of existing canals, pumping stations, equipment, I&D facilities (wherever possible) (ii) installation of new infrastructure for water supply and drainage (where essential), (iii) replacement of off-take gates, (iv) repairs and upgrading of pumps and pumping stations, (v) disposal of redundant equipment, and (vi) environmental and asbestos management of all activities.

12. Upgrading and modernization of the full scheme, addressing both engineering, institutional and other constraints, would cost far more than the grant funds available for the proposed investment project. Phase 1 therefore proposes cost effective modernization to address climate and earthquake hazards and improve farmers livelihoods through: (i) critical engineering works for the main system managed by ALRI, (ii) modernizing a core (gravity supplied) WUA managed area, and (iii) support for various institutional and management interventions. The gains under the proposed Phase 1 investment project would be consolidated and extended to the whole scheme area under one or more future projects.

13. The Yovon scheme extends over parts of three districts, Yovon, A. Jomi and Khuroson in Khatlon Province (**Figure 0-1**) and across Yovon and Khuroson river valleys. The net irrigable command area is 40,355 ha, of which 23,626 ha (59%) is gravity supplied and 16,729 ha (41%) pumped with cascades of pumping systems lifting water, on average 140m (up to about 300m maximum). The 7.4 km long Vakhsh Tunnel conveys water from the Vakhsh River to the Yovon valley, and a second 5.3 km long Khuroson Tunnel conveys water from the Yovon valley to the Khuroson valley.

Figure 0-2. Water User Associations included in this Phase 1 of the Project



Source: Consultants

14. Alternatives were considered for the scope, location and scale of the Project (Phase 1), and it is now considered, due mainly to funding constraints, that Phase 1 improvements are possible over a

40,355-ha area (**Figure 0-2**). The target area for Phase 1 is in the central portion of the Yovon valley areas and pumping stations in the Khuroson Valley. These interventions are considered optimal and most appropriate to utilize the existing infrastructure and maximize returns in terms of the project objectives. The detailed designs will be made at a later stage on this basis.

15. Climate change projections over the next 30 years indicate temperature rises of 1-3 ℃, and greater seasonal extremes. Concerning precipitation, some climate models predict increases, whereas other models show decreases. However, all the models predict an increase in intense precipitation events which would exacerbate flooding, stress on drainage, landslides and soil erosion. Rising temperatures will result in a small increase in crop water requirements. Depending on the crop type and its growing period, crops may face reduced or increased temperature stress.

16. Climate may affect the infrastructure already installed and the proposed developments through greater extremes of high and low temperatures and heavy snow falls. The I&D pipe facilities installed so far have been buried at depths between 1m and 3m. Ground and water are not predicted to freeze in winter and further adaptation measures proposed integrate civil-engineering and increased maintenance to reduce the risk of damage to the infrastructure and bio-engineering enhancements for slope control can be considered at the detailed design stage to help reduce surface erosion.

17. Potential major negative impacts in the Phase 1 implementation are identified but these are in general short term and reversible. Mitigation measures are developed in the environmental management plan (EMP) to reduce impacts to acceptable levels during the pre-construction, construction, and operational phases. Mitigation measures for repairs, replacement, commissioning and operationalizing of the modernized infrastructure for the Project (Phase 1) have been developed in conjunction with the agencies or entities established / delegated to manage the Project facilities and who will obtain the necessary environmental clearances before construction commences. In the pre-construction stage, the Contractor will be required to amend the EMP with site specific information on their construction proposals to meet the EMP requirements, including the implementation of community health and safety management plan as part of a Site Specific EMP (SSEMP) that will be required before construction commences under the contract. The EMP will include an Asbestos Management Plan (AMP). The SSEMP will include all requirements of the EMP, and AMP amended with the contractor's site-specific information.

Asbestos management is a major consideration because the I&D pipes installed up to 50 years ago are presumed to be a cement-based Asbestos Containing Material (ACM); with significant asbestos content based on anecdotal information. However, the ACM is "low risk" as the asbestos fibers are bound in the cement. However, low risk ACM can liberate asbestos fiber if it is mishandled, and a standalone AMP (**Annex 1**) has been prepared to ensure asbestos abatement for the Project does not become higher risk.

18. The condition of the buried ACM pipes is not fully investigated, and an Asbestos Investigation Report (AIR) will be completed during the detailed design stage. There is a need for a precautionary approach and to rule out ACM in other parts of the system to meet international standards. Initial inspection indicates pipe condition will vary from place due to exposure to groundwater.

19. Replacing and upgrading parts of the existing buried asbestos-cement pipes in the secondary and tertiary I&D systems is a critical environmental issue. The AMP has been compiled with measures for identifying, planning, and ensuring safe handling, transport and disposal of ACM cement pipes that need to be replaced. New pipes will be either high-density polyethylene (HDPE) or steel, but they must be integrated into the system without posing an unnecessary health risk to workers or public.

20. The AMP will meet internationally accepted practice for the maintenance and repair of installed ACM products, and it will be a requirement that the SSEMP (including updated AMP) also meets this standard and is adequately monitored throughout the works. ACM waste will be kept separate from other waste and the handling will be under trained workers supervised by trained foremen capable of ensuring

the subsequent transportation is followed using tracking systems to ensure delivery to the destinations for final disposal by burial, there will be no unofficial ACM waste gathering by casual waste collectors and no recycling or reuse of ACM for other purposes.

21. The proposed project will upgrade and modernize the present irrigation system in an existing structured farmed area. Potential negative environmental impacts in the pre-construction, construction and operational phases are generally localized, temporary, and small, and can be successfully minimized with good planning, contractor camp siting, and construction practices as well as acceptable management of asbestos. Modernization of the system will address climate and earthquake hazards and improve farmers livelihoods through: (i) critical engineering works for the main system managed by ALRI, (ii) modernizing a core (gravity supplied) WUA managed areas, and (iii) support for various institutional and management interventions, under the proposed investment project (Phase 1). The Project is anticipated to increase agricultural production and farm incomes, and generally improve socio-economic conditions. These gains can be consolidated to a larger scheme area as funds become available under future projects. It will not have significant negative environmental impacts that will nevertheless be adequately mitigated and carefully monitored.

22. **Implementation Arrangements.** ALRI will be the executing agency. The existing Project Implementation Group (PIG) for ADB's ongoing Water Resources Management in Pyanj River Basin Project[7] will implement the proposed Project. A dedicated section Project Implementation Unit (PIU, under PIG including the PIG-ES) will be responsible for day-to-day administration and project management of project components. Contractor(s) will be engaged to build the modernized system, supervised, on behalf of ALRI, by a Project Implementation Consultant (PIC). It is envisaged that an O&M Contractor will maintain the system under ALRI/PIG supervision.

23. The PIC will support the PIG to implement the Project, providing support: (i) for detailed design and bidding document preparation (including EMP) for infrastructure works, and to assist in quality control of works (ii) to prepare the detailed terms of reference (ToR), procurement documents, and training material, and supervision for the non-governmental organizations (NGO(s)) / firm(s) engaged for the institutional, gender and agricultural components of the Project, (iii) to supervise proper implementation of environmental and social safeguards, and (iv) provide Project monitoring and reporting as required under ADB Safeguard Policy Statement (SPS, 2009).

24. **Legal Framework.** The assessment and implementation of the Project will be governed by GOT laws, regulations, and Standards for environmental assessment and management and ADB SPS. The authority for environmental clearance is the Committee for Environmental Protection (CEP). The Environmental Protection Law (2011) is the overarching law for all environmental legislation. It is the principal law that regulates activities associated with the protection of the environment covers all relevant aspects of environmental protection. The Environmental Expertise Law (2012) stipulates the environmental assessment requirements of Tajikistan providing a mechanism for the review of environmental assessments, prevent ecological imbalance, the regulate use of natural resources, during the assessment of environmental impacts of projects and set procedures for decision-making regarding the implementation of projects. The process under the Environmental Expertise Law (2012) is known as State Environmental Expertise (SEE). Operational monitoring is carried out by the Government Authority for Specialized Inspection (GASI) which inspects compliance with all environmental laws based on a series of subsidiary regulations and checklists.

25. Based on the rapid environmental assessment (REA), the Project is classified as Category B under ADB SPS because the potential adverse environmental impacts are site-specific, few if any of them are irreversible, and mitigation measures can be designed readily.

26. **Consultation and Information Disclosure.** Preliminary disclosure and discussion with

[7] 47181-002: Water Resources Management in Pyanj River Basin Project | Asian Development Bank (adb.org)

environmental authorities was undertaken during 2020/21. Further public consultation will be made by ALRI/PIG after the completion and disclosure of this IEE. During the preparation of the statutory environmental assessment, the appraisal will be subject to the process of SEE. To satisfy ADB requirements, the IEE will be disclosed to affected people.

27. The stakeholder consultation process disseminated information to key stakeholders including the authorities through meetings and office-based interviews with officials and the general public in October 2020 and April 2021 in the areas around Yovon near the Project location. Information will be provided through meetings on the scale and scope of the Project works and the expected impacts and the proposed mitigation measures. The process will also gather information on relevant concerns of the local community so as to address these in the project implementation stages. Information of environmental safeguards documents (this IEE and periodic environmental monitoring reports) will be disclosed on ALRI website[8] in both Tajik and Russian languages as well as in English. The information will also be made available at the district offices of the CEP and ALRI.

28. **Grievance Redresses Mechanism (GRM).** Project GRM procedures are coordinated with the EMP and will be established to help resolve issues associated with the Project. The GRM is coordinated with the social workstream and will receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the environmental and social performance of the Project. Resolution of these issues and concerns will be undertaken expeditiously and according to the procedures of the GRM. The complaints/issues registry maintained at the site by PIG project officers (including PIG-ES) and by the contractor and operators that will be subject to monitoring by ALRI. The GRM aims to provide an accessible, time-bound, and transparent mechanism for the affected persons to voice and resolve environmental and social concerns linked to the Project.

29. **Environmental Management Plan (EMP).** Mitigation measures, environmental monitoring, and capacity development are required to minimize the environmental impacts in the design, construction and operational phases. The main issues relate to planning the modernization of the upgraded and replaced project structures, maintenance of roads, I&D pipework and control of construction and operational impacts. Impacts anticipated during construction include impediments to movements of people (due to transportation of materials and equipment), temporary disturbance on agricultural land, soil erosion, noise and dust, occupational health and safety risk (including the risk from handling of asbestos containing materials and risk of COVID-19), and social conflicts between local people and workers from other regions. Impacts during operation include conflict in water supply rights, disproportionate benefits on women, soil erosion, leaching of soil nutrients and changes in soil characteristics, occupational and community health and safety risk, and scouring of canals.

30. The EMP is conveniently summarized in the Environmental Management and Monitoring Plan (EMMP, **Table VII-4**) with the activities and mitigation measures and monitoring in all stages; as far as can be determined at this stage. Training and capacity building are included.

31. It is envisaged that the contractors engaged to upgrade and rebuild the project structures and facilities will follow the EMP presented in this IEE (including updated AMP). The construction contractors for the Project facilities will compile their SSEMP and have it reviewed by the PIG environmental specialist (PIG-ESs) and approved by PIG prior to starting construction. The SSEMP will include specific requirements from the SEE and CEP that cannot be known at this stage. For purposes of this IEE, the upgrading works are referred to as the construction phase. The key issues for the SSEMP for the Project facilities have been covered, as far as practicable in the EMP included in this IEE. The SSEMP will be implemented by the contractors who will be monitored and supervised by PIG-ES. This will include all aspects of the asbestos management as specified in the AMP. In addition, Government monitoring of operations will take place by the Sanitary Inspectorate of the Ministry of Health (ISH) and Industrial Safety

[8] ALRI website: https://alri.tj/en

Inspectorate (ISI) as required.

32. To ensure the impacts from the Project (Phase 1) construction and operational activities are mitigated to the greatest extent feasible, ALRI assisted by PIG will make sure that the EMP in this IEE, and the AMP updated based on detailed design are integrated into bid and contract documentation and operational agreements and that contractors and operators prepare their SSEMP in the preconstruction phase.

33. Following induction training provided by the IES, NES, PIG-ES and PIC, the construction contractor will prepare SSEMP detailing how they propose to implement the construction works and operations and comply with the EMP. The SSEMP will include the contractors proposed actions to cover: (i) summary of construction impacts and mitigation; (ii) water supply for construction; (iii) connections to drainage, waste water arising (if any) and recycling and reuse of wastewater; (iv) inclusion of the requirements of the updated AMP stating the proposals for removal, handling, transportation and disposal of ACM as a minimum in line with this IEE; (v) solid waste management and disposal – including ACM and hazardous waste; (vi) noise, dust and odor suppression; (vii) utilities, power and telecommunications reprovisioning and commissioning (if necessary); (viii) temporary and permanent surface drainage; (ix) construction materials management; (x) excavation and rehabilitation of land; (xi) traffic management; (xii) worker and public safety including coronavirus diseases (COVID-19) health and safety management plan and emergency response plan; (xiii) vegetation removal, site cleanup and revegetation / amenity planting for amenity and bioengineering for erosion control; (xiv) construction camp management plan; and (xv) communications plan. The communications plan will indicate how the Contractor will interact and inform the community in advance of planned works and mitigation measures specified in the EMP (such as using a Community Liaison Officer [CLO]).

34. The operation of the Project should have minimal impacts on the surrounding environment with significant beneficial effects. The more reliable and better managed irrigation improvements more efficient agricultural practices, provide employment for local persons, improve drainage, waste disposal and metered water usage. The asphalt pavement on the roads can be expected to reduce noise and the accumulation of roadside dust and therefore air pollution from noise and disturbed dust should also be reduced.

35. **Conclusion and Recommendations.** The main difficulties encountered by the consultants in compiling the IEE are the preliminary nature of some information such as exact scale of Phase 1 project, length and numbers of ACM pipes to be removed and replaced for the investments that will take place in the Project. Details may only be known at the detailed design stage. The Project construction is over a large 40,355 ha area in Phase 1 although most land required within the Vakhsh River Basin I&D system is already in use for much the same purpose as proposed. Locations for disposal of ACM will be resolved with the environmental authorities at the detailed design stage. The impacts from construction and operation will be manageable and no insurmountable impacts are predicted, provided that the EMP (including AMP) is included in the contract documents and that SSEMP is implemented thoroughly. ALRI (assisted by PIG) will ensure that the EMP (including AMP) is included in the contract documents, and the EMP provisions are implemented and monitored to their full extent. In the event that any design details change the locations or scope of the proposed Project works, and unanticipated environmental impacts become apparent, the environmental assessment, this IEE and EMP will be reviewed, revised/updated accordingly. The environmental impacts of the Project (Phase 1) should be minor and manageable if the mitigation measures established in the EMP are implemented and that updated SSEMPs are implemented thoroughly as necessary in due course. This IEE also sets out the preliminary assumptions on the requirements for monitoring.

36. **Structure of the IEE Report.** This IEE report is organized into the following Sections.

- Executive summary
- Section I: Policy, Legal, and Administrative Framework
- Section II: Description of the Project
- Section V: Anticipated Environmental Impacts and Mitigation Measures
- Section IV: Description of the Environment (Baseline Data)
- Section V: Anticipated Environmental Impacts and Mitigation Measures
- Section VI: Information Disclosure, Consultation, and Participation
- Section VII: Environmental Management plan
- Section VIII: Grievance Redress Mechanism (GRM)
- Section IX: Conclusion and Recommendation
-

- Annex 1. ASBESTOS MANAGEMENT **PLAN**
- Annex 2. MINUTES OF CONSULTATION

I. Policy, Legal, and Administrative Framework

A. Legal Framework of Tajikistan

37. Tajikistan has a strong environmental regulatory framework for protection of the environment and the use and protection of the country's natural resources. This includes laws covering: (i) environmental protection; (ii) environmental auditing and monitoring; (iii) protection of flora and fauna; (iv) environmental information and education; (v) quality of soils, water, and air; (vi) biological safety; (vii) human health and safety; and (viii) waste and chemicals management. In addition, regulations approved by the GOT also protect the citizen rights to environmental safety, environmentally acceptable products, and ecological environment, access to environmental information, and the ability to invest in improving environmental conditions in the country. The laws and regulation approved by the GOT create a favorable legal basis for the protection of the environment in the country, as well as for the use and protection of its natural resources. Highlights of these laws, codes and regulations are in the following sections.

38. In the Republic of Tajikistan, environmental principles are included in the Constitution, codes and laws on air quality, noise, mineral resources, land management, forests, health and safety, waste and chemicals management; dating back to 1993. Most laws and codes have been amended several times since, with the latest improvements in 2014. The Environmental Protection Law (2011) and the Environmental Expertise Law (2012) cover all aspects of environmental assessment.

39. The CEP is responsible for environmental monitoring and management. The GOT also includes ISH, ISI and the Mining Inspectorate. An environmental licensing system exists for hazardous waste management and mining. The environmental permitting system regulates the use of natural resources.

40. Department of the CEP. The national environmental authority is the CEP. It does not have the seniority of a ministry. There are regional and other subordinated branches of the CEP. CEP submits annual report on the implementation of the State Environmental Program, but these are not made available publicly. The CEP at the national, regional and other subordinate levels is responsible to review environmental assessment for projects by participation in a process called the State Environmental Expertise (SEE).

41. The Environmental Protection Law (2011) states that SEE must be carried out by a CEP at the national, regional and other subordinate level, which is appointed by a duly authorized state environmental agency. The CEP at the national level has an overarching mandate that includes policy development and inspection responsibilities. The CEP has sub-divisions at region (*oblast*), city (*rayon*) levels in the form of environmental protection departments (HOPT) within the *Hukamat* (local administration) in each city or district.

1. Environmental Protection Law (2011)

42. The Environmental Protection Law (2011) enforces Tajikistan's environmental policy to prioritize conservation measures based on scientific principles, to conserve nature and support the sustainable use of resources. The law defines powers and functions and sets up the CEP that is the authority for clearance of environmental assessments.

43. The Law also provides for measures to ensure the rights of the public and individuals to a safe and healthy environment and requires the SEE process to include environmental assessment of any activity that may have a negative impact on the environment. The Law and responsibilities of officials and enterprises prevent and eliminate environmental impacts and define environmental emergencies and establishes procedures. The obligations of persons or organizations that cause damage to the environment and violate the law are defined. Enforcement of environmental legislation may be at the state, ministerial, enterprise level or public control. State control also involves the Industrial Safety Inspectorate (ISI) and Sanitary Inspectorate of the Ministry of Health (ISH) and the Mining Inspectorate. Public control is carried out by public organizations or trade unions in relation to any state body, enterprise,

organization or individual.

2. Environmental Expertise Law (2012)

44. Environmental Expertise Law (2012) is intended to prevent negative impacts on the environment as a result of planned activities, predict impacts from activities that are not considered to be harmful to the environment, and create databases on the state of the environment and knowledge of people impacts to the environment. The environmental assessment is examined by a committee in a process called SEE.

45. Both Environmental Expertise Law (2012) and the Environmental Protection Law (2011) stipulate the SEE requirement. The SEE is a prerequisite before the initiation of any activity that may have adverse impact on the environment. The public environmental expertise only becomes mandatory after its results are approved by the CEP and therefore does not have equal importance in law.

46. The Environmental Protection Law (2011) introduced the concept of the State exercising power for an environmental overview of planned projects called SEE which examines compliance of projects with environmental legislation, standards, and environmental safety for society. The SEE process must be scientific, comprehensive, and objective and must lead to conclusions in accordance with the law. SEE precedes decisions about activities that may have a negative impact on the environment. Funding for programs and projects is allowed only after the publication of a positive result or conclusion from the SEE process is obtained from the CEP (at the state level by GOT or by its regional branches of the CEP, or both depending on the complexity of the project).

47. Approval (i.e. a positive result or conclusion from the SEE process) must be issued by the CEP within 30 days after submission of the environmental assessment report (EAR) to CEP, but the project designer can be requested by CEP for an extension of time to complete the EAR review. During the 30 days, leading scientists and qualified external experts may be invited to participate in the EAR review. For very complex projects, the review and approval period can be extended up to 60 days. Once granted the approval from CEP remains in effect for two years.

48. Under the Environmental Expertise Law (2012), a public environmental expertise of an activity can be carried out by any public organization or citizens. They may send proposals to the responsible state bodies on environmental issues of the implementation of planned activities; receive information on the results of the conducted state environmental assessment from the relevant responsible authorities. The public expertise should also be taken into account during preparation of the SEE. Public organizations preparing this expertise must inform the population about the beginning of the process and also about its results.

3. Activities subject to State Ecological Expertise

49. Under the Environmental Expertise Law (2012), the following activities and projects are required to have environmental assessment and undergo SEE:

a) Draft of state programs, pre-planning, pre-design, and design documentation for economic development;

b) Regional and sectorial development programs;

c) Spatial and urban planning, development, and design;

d) Environmental programs and projects;

e) Construction and reconstruction of objects, various types, regardless of ownership rights:

f) Draft environmental quality Standards and other regulatory, technological and methodological documentation regulating economic activities;

g) Existing enterprises and economic entities.

50. When detailed design is known, the Project will be subject to domestic environmental assessment process and an EAR will be formally submitted to the CEP to decide on who to invite to participate in the EAR review. All construction work, including restoration, must be assessed for impacts on the environment in the SEE. Proposed mitigation measures must be reviewed during the SEE process and monitored by the CEP. Environmental clearance of the Project after evaluation of the EAR by the SEE process must be obtained before the civil works' bidding process.

4. Environmental Impact Assessment

a. Legal Framework

51. The requirements for environmental assessment are covered in the Environmental Expertise Law (2012). The EAR review is a component of the SEE (which includes both review by the Department of the Environment Committee[9] and the process). The environmental assessment is carried out by the project proponent. Screening of the need for an environmental assessment and scope of the content of the EAR are not included in the environmental assessment process but the requirements for content of the EAR are covered by Government Resolution 509 (2014). Relevant existing environmental standards and regulations must be included, and short-term and long-term environmental, economic and demographic impacts should be assessed, and sufficient environmental protection and mitigation measures must be included to prevent and minimize pollution and improve the quality of the environment.

52. Other rules and regulations governing the conduct of environmental assessment include:

- Procedure for assessing environmental impact (GOT No. 532, 1 November 2018);
- List of sites and activities for which environmental assessment is mandatory (GOT No. 532, 1 November 2018.);
- Procedure for conducting SEE (GOT No. 697, 3 December 2012);
- Guidance on the composition and procedure for the development of the content and structure of documentation to be submitted for review (SEE) as well as the agreement and approval of all projected budget or investment estimates, design drawings or documentation to be developed in coordination with SEE, buildings and structures and EAR chapters, Strategic Environmental Assessment (SEA) and Feasibility Studies; and
- The list of sites and activities for which the preparation of documentation on environmental impact assessment is mandatory (adopted by the Government of the Republic of Tajikistan No. 532 drafted on 1 November 2018).

53. The developed existing regulatory framework is designed to determine the legal basis for the implementation of projects and their compliance with state requirements for environmental protection and reduction of environmental impact.

b. State Environmental Expertise (SEE) procedures required for the Project

54. The Project will require SEE at least under the requirement under para. 49 "e) Construction and reconstruction of objects, various types, regardless of ownership rights".

55. The Environmental Protection Law (2011) regulates GOT SEE requirements. Several subsequent resolutions by GOT have amended the law and regulations. The most recent regulations are (i) #1448 of 2017 which determines procedures for SEE and (ii) #235 of 2013 and #532 of 2018 (Appendices 2 and 3) which prescribe which projects are subject to the SEE.

56. The terms of the law apply to all new projects, as well as rehabilitation and expansion of existing services or construction activities and projects that use natural resources. According to the earlier resolution #235 of 2013, "reconstruction and ameliorative improvement of the old, irrigated lands on the

[9] The Department of the Environmental Committee is part of the CEP and acts as the secretariat for the SEE process.

areas more than 1,000 ha" requires the SEE. In this case, the Project is more than that and it is presumed will require the SEE approval.

57. ALRI is planning to carry out and finance the project and will be identified as a project proponent within the meaning of the SEE procedures. The responsible party for implementing the Environmental Protection Law (2011) law will be the state level CEP.

58. The scope of the environmental assessment is defined by the Law. The EAR will be reviewed by the environmental authorities. The CEP/SEE will provide their comments and recommendations within 30 days after submission of the EAR to CEP. Based on the conclusion of the experts and the SEE, the CEP will make a decision about approval or disapproval of the project.

59. In order to meet GOT Standards, the project EAR must contain information on (a) the purposes of implementation of the planned project, (b) on alternative options of implementation, (c) data on state of environment in the territory, (d) possible negative effects of project implementation for health and safety of the population, (e) impacts on the environment and natural objects, and (f) measures for the reduction and prevention of impacts.

60. It is expected that the information in this IEE will be used to prepare the EAR for submission to CEP. In order to meet both GOT and ADB requirement, the EAR will contain the following chapters: (i) executive summary; (ii) review of environmental legal and policy details; (iii) description of the project; (iv) environmental baseline data; (v) project alternatives; (vi) analysis of potential impacts and recommendations for minimizing, mitigation and elimination of impacts; (iv) information disclosure and public consultation and records of responses of public and other stakeholders on the project (vi) environmental management plan (including asbestos abatement plan, grievance redress mechanism and environmental monitoring program.

61. The detailed design stage which will prepare the contracts is expected to start in 2022. ALRI will prepare the EAR (in Russian language) for construction of the Project during the detailed design stage, based on this IEE and the detailed designs and submit the EAR to the state level CEP. The positive conclusion of the SEE and the acceptance of the EAR needs to be obtained before the bids are invited from contractors. The positive conclusion of the SEE and EAR clearance from the state level CEP can be expected no more than 60days after the EAR submission to CEP.

5. **Environmental Monitoring Law** (№ 707 as of 25 March 2011)

62. Environmental Monitoring Law (2011) determines organizational, legal, economic and social basis of ensuring environmental monitoring in the Republic of Tajikistan and governs the relations between public authorities, self-government institutions of settlements and villages, public associations and citizens in this area.

63. Environmental monitoring is performed for the purpose of: (i) observations on the state of the environment and sources of anthropogenic impacts on the environment; (ii) forecasting changes of the state of the environment; and (iii) ensuring reliable information about adverse environmental effects. Regular environmental monitoring and data collection shall be carried out to assess the condition and functional integrity of natural ecosystems and public health. Estimates shall be made of changes in conditions and programs shall be developed to mitigate the consequences of adverse environmental impacts. The state of the environment shall be informed to the public and authorities.

6. **Environmental Audit Law** (№ 785, 26 December 2011)

64. This Law determines the principles and procedure for carrying out environmental audit to prevent harmful effects on the environment, life, and health of the population. The concepts are based on sustainability to provide a balance between social and economic requirements and preserving a favorable natural environment. Decisions on resource potential should be guided by the requirements and satisfaction of present and future generations.

65. Ecological safety, environmental audit, and licensing and responsibilities of ecological auditors and other related concepts are defined. The environmental audit is required to analyze compliance of activities with current legislation and regulations in the field of environmental protection and natural resources.

66. The ecological auditor holds certification for competency (following qualifying examination) in the field of environmental protection from an authorized state body of the Republic of Tajikistan. An environmental auditing organization can also hold a license for the right of carrying out environmental audit. Environmental audit is based on the Constitution and comprises the Law, other regulatory acts and the international legal acts recognized by the Republic of Tajikistan.

67. The purpose of environmental audit seeks to (i) assist businesses to develop environmental policy; (ii) prioritize strategy and action plans that support implementation of established environmental laws and regulations; and (iii) create a mechanism to monitor and enforce effective regulation of environmental management to ensuring sustainable development.

68. The tasks and principles and content of the audit are prescribed in the Law. Statutory environmental audit may be required according to the decision of public authorities. The business entity may also engage an environmental auditing organization on its own initiative.

7. **Soil Conservation Law** (No. 555 as of 16 October 2009)

69. This Law determines the basic principles of state policy, the legal basis of activities of public authorities, physical persons and legal entities for the purpose of rational and careful use of soils, preserving quality, fertility and protection of soils against the negative phenomena and governs the interactions connected with the protection of soils.

8. Public participation

70. The Environmental Protection Law (2011) requires compulsory disclosure and consultation of the EAR after the preparation of the report. Citizens have the right to receive environmental information (Article 13), as well as to participate in the development, adoption and implementation of decisions related to environmental impact. The latter is ensured by public discussion of projects of environmentally important solutions and public environmental overviews. Public representative bodies are obliged to take into account the comments and proposals of citizens. The project proponent and the entity that prepared the EAR is obliged to undertake public consultation with the local government and affected communities before submission of the EAR to the CEP. Further details and procedures of public consultation is regulated by the GOT Decree No. 532, 2017. At each stage of the environmental assessment, public or the affected communities will be consulted in forms of meetings, surveys to reflect their views on direct and indirect environmental impacts of the project. The EAR will be presented to the local public meeting after the completion of the report.

9. Licenses

71. Licenses are legal instruments for regulating certain potentially hazardous activities where minimum qualifications and strict adherence to the rules are required to ensure their effective, safe implementation and not lead to potentially very significant and irreparable harm to the environment and human health. In particular, licenses are required for the handling of hazardous waste; for activities in the field of industrial safety, sources of ionizing radiation, production and handling of pesticides and other agrochemicals. They are issued by the relevant industry regulator (ministry or committee) or the organization to which they have delegated such authority. Licensing is also used to ensure the most efficient and sustainable use of natural resources. For example, Licenses are required for the search, collection, or extraction of minerals (borrowed areas) or for the construction of underground structures not related to the extraction of minerals.

10. Environmental permits

72. Permits are designed to ensure the sustainable use of natural resources. There are two types of permits: (a) permits for the use of natural resources; and (b) permits for emissions or discharges. Natural resource use permits allow their owners to take a specific amount or quantity of a specific natural resource within a specific area and time period. They are issued both to individuals (for example, for hunting a certain species of animals or harvesting on certain trucks) and organizations (for example, permits for the extraction of ground or surface water for a specific use). By law, permissions are required for any commercial use of any resource. Permits for the release of contaminated substances are issued by the relevant inspectorate (for example, formerly the State Water Inspectorate or State Air Inspectorates, but now departments) of the local state environmental protection committees to industrial or agricultural enterprises and utilities that release by-products into the environment. Permits allow to release into the environment a certain amount of contaminated substances (gases, liquids, solid waste). Permits are usually issued for one year and indicate the maximum permissible concentration of pollutants in the emitted substances, the maximum volume of the pollutant and the permitted pollutants.

73. Other regulations with general relevance to environment but no specific relevance to this project include:

- Law on Specially Protected Natural Areas (№ 786 as of 26 December 2011);
- Law on Environmental Education (№ 673 as of 29 December 2010);
- Law on Environmental Information (№ 705 as of 25 March 2011);
- Law on hydro Meteorological activities (No. 86 as of 2 December 2002);
- Law on the Production and Safe Handling of Pesticides (No. 1 as of 22 April 2003);
- Law "On the protection and use of flora" (No. 31 as of 17 May 2004);
- Law on the protection of population and territories from emergencies of Natural and Techno genic Origin (No. 53 as of 15 July 2004);
- Biosafety Law (No. 88 as of 1 March 2005);
- Law on the conservation and use of wildlife (No. 354 as of 5 January 2008);
- Law on the supply of drinking water (№ 670 as of 29 December 2010);
- Law on the use of renewable energy sources (№ 857 as of 12 January 2012);
- Law on the protection of atmospheric air (№ 915 as of 28 December 2012);
- Law on Pastures (№ 951 as of 19 March 2013);
- Law on Biological Management and Production (№ 1001 as of 22 July 2013);
- Law on radioactive waste management (№ 1002 as of 22 July 2013);
- Law on ensuring sanitary and epidemiological safety of the population (2003 to № 1010, 22 July 2013);
- Law on Fishing and Protection of Fish Resources (№ 1021 as of 19 September 2013).
- Energy Saving Law (№ 524 as of 6 February 2002);
- Law on industrial and household waste (№ 44, as of 10 May 2002, edition of the Law of the Republic of Tajikistan № 736 as of 28 July 2011); and
- Law on ensuring the environmental safety of road transport (№ 1214).

11. Labour Code (1997)

74. The Labour Code (1997) and the Occupational Safety and Health Act (OSH 2009) are the main occupational safety and health laws of Tajikistan. The Labour Code establishes labor rights. Labour Code (Cap.11) covers occupational safety and health. The OSH Act supplements provisions of the Labour Code with a legal framework for regulation of occupational safety and health between employers and workers. Powers of state labor inspectors are laid down in Article 25 of the OSH Act. Legal provisions on protection of workers from specific occupational hazards are contained in various separate legislative enactments such as: the "Act on Production and Safe Handling of Pesticides and Agrochemicals “and

the "Act on Counteraction to HIV and AIDS and the "Act on Fire Safety". However there is no such parallel legislation on protection of workers from asbestos fibers, The Code on Administrative Offences and the Penal Code of Tajikistan provide for penalties concerning occupational safety and health.

12. State environmental program 2009-2019

75. The program, approved in 2009, obliges ministries and departments, heads of administrations and mayors of cities to improve environmental conditions and ensure sustainable development of the country during the economic transition. It calls for the adoption of modern environmental standards for water, air, soils, solid waste, toxic waste, and noise control based on maximum allowable quantities. The Standards must be supplemented by permits for discharge. The program is accompanied by wide ecological zoning, dividing the country into ten zones (Syrdarya, Northern Turkestan, Zeravshan, Gissar, Vakhsh, Dangara, Khulbuk-Kulyab-Chubek, Karategin-Baljuvan-Shurobad, Garm-Muksu-Balandkiik and Badakhshan).

13. Environmental Standards

76. Standards cover air, water quality, noise, vibration, magnetic fields and other physical factors, and residual traces of chemicals and biologically harmful microbes in food. If limits are exceeded, there are administrative and financial penalties. Several ministries define environmental quality standards, each in its own area of responsibility such as the Ministry of Health which has established acceptable levels of noise, vibration, magnetic fields and other physical factors.

77. The environmental quality standards in Tajikistan are based on GOST, SNiP and SanPiN. GOST refers to a set of technical standards maintained by the Euro-Asian Council for Standardization, Meteorology and Certification (EASC), a regional standards organization operating under the auspices of the Commonwealth of Independent States (CIS). SNiP covers construction codes for buildings and other structures. SanPiN are the sanitary Standards. The national standards applicable to the Project are summarized in Table I-1 for reference. ADB SPS requires application of pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines (EHS Guidelines)[10] that are also presented in the tables. Guidelines for international best practice will also be drawn from the EHS Guidelines: Annual Crop Production.[11]

[10] World Bank Group's Environmental, Health and Safety Guidelines (2007), Washington D.C. https://www.ifc.org/wps/wcm/connect/29f5137d-6e17-4660-b1f9-02bf561935e5/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES&CVID=jOWim3p in English and https://www.ifc.org/wps/wcm/connect/be37221a-fc47-4379-b539-eca3fe72c3e6/General%2BEHS%2B-%2BRussian%2B-%2BFinal_.pdf?MOD=AJPERES&CVID=jqeI79F&ContentCache=NONE&CACHE=NONE in Russian

[11] World Bank Group's EHS Guidelines: Annual Crop Production (2016), Washington D.C. https://www.ifc.org/wps/wcm/connect/766c4c6e-e4b1-41ef-a980-3610bce404e8/Annual+Crop+Production+EHS+Guidelines_2016+FINAL.pdf?MOD=AJPERES&CVID=lfe82iC

Table I-1. National Standards applicable to the project

1	31431—2011. Nature conservation. Air. Set of maximum allowable emissions (MAE). 29 November 2011
2	31434—2011 Nature conservation. Air. Determination of efficiency parameters of dust collection systems. 29 November 2011
3	IEC 61241-0—2011 Electrical equipment used in areas containing flammable dust. Part 0. General requirements. 29 November 2011
4	GOST 17.0.0.01-76 (CT CEB 1364-78) (in edition 1987) System of Standards for the protection of the environment and the improvement of the use of natural resources. Executive summary
5	Executive summary GOST 17.0.0.04-80 (1998) Nature conservation. Environmental passport (certificate) of an industrial facility. Executive summary
6	GOST R IS014001-98 Environmental management systems. Requirements and guidelines.
7	GOST 17.0.0.02-79 (1980) Nature conservation. Provision of meteorological control of air pollution, surface water and soils.
8	GOST 17.1.1.01-77 (CT CEB 3544-82) Water use and protection. General terms and definitions.
9	GOST 17.2.1.01- 76 Emission classification (content).
10	GOST 12.1.014-84 (1996) OSSS. Air in the workplace. method for measuring the concentration of pollutants using indicator tubes.
11	GOST 12.1.005-88 (1991) OSSS. General hygiene requirements for air in the workplace.
12	GOST 17.2.2.05-97 Standards and methods for measuring emissions containing diesel exhaust gas from tractors and self-propelled agricultural machines.
13	GOST 21393-75 Diesel vehicles. Exhaust gas opacity. Measuring Standards and methods.
14	GOST 17.2.2.03-77 Carbon monoxide concentration in the exhaust gas of vehicles with gasoline motor.
15	GOST 17.2.2.03-87 Standards and methods for measuring carbon monoxide in the exhaust gas of gasoline engine cars.
16	GOST 17.4.2.01-81 Hygiene item parameters.
17	GOST 17.4.1.02-83 Chemical classification for pollution monitoring.
18	GOST 12.1.003-83 (1991) OSSS. Noise. General safety requirements
19	GOST 12.1.023-80 (1996) OSSS. Noise. Noise threshold methods for stationary machines.
20	GOST 12.1.029-80 (1996) OSSS. Means and methods of protection against noise. Classification.
21	GOST 12.1.036-81 (1996) OSSS. Noise. Acceptable noise levels in residential and public buildings.
22	GOST 12.1.007-76 (1999) OSSS. Harmful substances. Classification and general safety requirements.
23	GOST 12.4.119-82 OSSS. Respiratory PSE. methods for assessing the protective properties of aerosols.
24	GOST 12.4.125-83 (1985) OSSS. Collective protection against mechanical factors. Classification.
25	SNiP 2.05.02-85 (1985) Construction norms and rules for roads for vehicle
26	Sanitary norms and rules (SanPin)
27	SanPin 2.1.4.559-96 Potable water. Hygienic requirements for water quality from centralized drinking water supply systems. Quality control
28	CH 2.2.4/2.1.8.562-96 Noise in workplaces, residential and public buildings and in residential areas.

78. The National Standards provide further detail to the review of legal and policy requirements and have general application as performance standards for the project in terms of environmental management.

79. The following ambient air quality standards provide the legal requirements for control of emissions and have general application as performance standards for the project in terms of environmental management of air quality. The parameters shown are those most likely to be influenced by project activities producing dust and vehicle emissions.

Table I-2. Ambient Air quality Standards

Air Quality Parameter	National Standard	EHS Guidelines[12]	Adopted Project Standard
PM2.5	-	*25 (24 h) (µg/m^3)	*25 (24 h) (µg/m^3)
PM10	-	*50 (24 h) (µg/m^3)	*50 (24 h) (µg/m^3)
NO	0.06 mg/m^3	-	#0.06 mg/m^3
$N0_2$	0.04 mg/m^3	*200 (1 hr.) (µg/m^3)	*200 (1 hr.) (µg/m^3)
$S0_2$	0.05 mg/m^3	*20 (24 h) (µg/m^3) *500 (10 min) (µg/m^3)	*20 (24 h) (µg/m^3) *500 (10 min) (µg/m^3)
CO	3 mg/m^3	-	# 3 mg/m^3
Ozone	-	100	100 (8 h)(µg/m^3)

Source: *= EHS Guidelines, # = Tajikistan Standards[13], PM=Particulate Matter

80. Effluent standards in **Table I-3** (MAC: maximum allowable concentration) provide the legal requirements for control of effluent (discharged to surface water bodies) and have general application as performance standards for the project in terms of environmental management of water quality. The effluent water quality standards provide the legal requirements for maintenance of ambient water quality with maximum permissible concentrations for water parameters in the waters to which the Project's irrigation water will overflow. This MAC (on effluent) is also used as environmental standards of fresh surface water, although there is no standard on parameters commonly used to assess water quality i.e., COD, BOD, NH_3-N, fecal coliform etc.

Table I-3. Effluent standard in Tajikistan[14]

Parameter	Maximum Allowable Concentration	EHS Guidelines[15]	Adopted Project Standard
pH	6.5-8.5	6-9	6.5-8.5 #
BOD	-	30 mg/l *	30 mg/l *
COD	-	125 mg/l *	125 mg/l *
Total Nitrogen	-	10 mg/l *	10 mg/l *
Total Phosphorus	-	2 mg/l *	2 mg/l *
Oil and grease	-	10 mg/l *	10 mg/l *
Total Suspended Solids	-	50 mg/l *	50 mg/l *
Total Coliform bacteria	-	400 MPN/100ml *	400/100 ml *
Aluminum (Al)	0.04 mg/m^3	-	0.04 mg/m^3 #
Iron (Fe)	0.1 mg/m^3	-	0.1 mg/m^3 #
Cadmium (Cd)	0.005 mg/m^3	-	0.005 mg/m^3 #
Copper (Cu)	0.001 mg/m^3	-	0.001 mg/m^3 #
Nickel (Ni)	0.01 mg/m^3	-	0.01 mg/m^3 #
Lead (Pb)	0.006 mg/m^3	-	0.006 mg/m^3 #
Zinc (Zn)	0.01 mg/m^3	-	0.01 mg/m^3 #
Chromium (Cr+6)	0.02 mg/m^3	-	0.02 mg/m^3 #
Chromium (Cr3+)	0.07 mg/m^3	-	0.07 mg/m^3 #
Oil and petrochemicals	0.05 mg/m^3	-	0.05 mg/m^3 #
Arsenic (As)	0.05 mg/m^3	-	0.05 mg/m^3 #
Calcium (Ca)	180 mg/m^3	-	180 mg/m^3 #
Silicon (Si032)	1.0 mg/m^3	-	1.0 mg/m^3 #

BOD = Biological Oxygen Demand, COD = Chemical Oxygen Demand, MPN = most probable number
Source: *= EHS Guidelines (See footnote 10), # = Tajikistan Standards[13]

81. The standards for the quality of irrigation water, taking into account the presence of trace elements, as well as bacterial contamination are given in **Table I-4**.

[12] See footnote 10.
[13] Procedure of Environmental Impact Assessment accepted by Resolution No. 464 of the Government of the Republic of Tajikistan dated 3 October 2006.
[14] See footnote 13. The effluent standard in Tajikistan is also used as environmental standards of fresh surface water.
[15] Indicative Values for Treated Sanitary Sewage Discharges (Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation.)

Table I-4. Irrigation water quality standards in Tajikistan

Parameter (indicator)	Recommended value	Allowable value
pH	6.5-8.0	6.0-8.4
Temperature (C°) a) dry steppe b) steppe and desert zones c) surface watering sprinkling d) Moisture charging watering	 a) 15-25 b) 15-25 c) 15-30 d) > 5	 a) 10-35 b) 15-35 c) 15-35 d) > 5
Manganese general Iron Copper Boron Fluorine Cobalt Zinc Molybdenum Vanadium Phenols Cyanide Lead Mercury Cadmium Selenium Arsenic Chromium general Aluminum Lithium Beryllium Nickel Na ²Co³ NaHOC³ Coliform bacteria **	N/A	0.2 mg/l 5.0 (0.3)* mg/l 0.2 mg/l 0.5-0.3 mg/l 1.0 mg/l 0.05 mg/l 1.0 mg/l 0.01 mg/l 0.001 mg/l 0.001 mg/l 0.1 mg/l 0.03 mg/l 0.005 mg/l 0.001 mg/l 0.001 mg/l 0.05 mg/l 0.1 mg/l 0.5 mg/l 0.03 mg/l 0.0002 mg/l 0.1 mg/l < 0.2 mg/l < 1.25 mg/l 1,000 MPN/ml

*) in brackets is the permissible value for drip irrigation

** epidemiologically dangerous bacteria (pathogens of typhoid, salmonella, helminth eggs) is not allowed.

82. According to the degree of influence on soils (the development of processes of salinization, alkalinization and soda formation), the quality of irrigation water is divided into four classes (**Table I-5**). The intake of irrigation water with salts does not lead to their accumulation above the permissible level for soils and plants. Salts in excess of the permissible level must be diverted outside the root layer by additional water supply during the leaching regime, the intensity of the leaching regime must increase with the properties and composition of the soil.

Table I-5. Characteristics of irrigation water classes in Tajikistan

Water class	Assessment of water quality	Characteristics
Class I	Good	Irrigation water does not adversely affect soil fertility, productivity and quality of agricultural products, surface and groundwater. No limitation of the composition of crops is required.
Class II	Satisfactory	Irrigation water does not adversely affect the quality of agricultural products, surface and groundwater. With insufficient drainage, soil salinization is possible: a decrease in the yield of crops with low salt tolerance to 5-10%. To remove salts of an over-permissible level of content in the soil, a moderate leaching irrigation regime with ensured drainage is required, as well as a special set of reclamation measures.
Class III	Satisfactory with risk (threat) of deterioration	Irrigation water has an adverse effect on soil fertility and crop yield: decrease in yield of crops of low and medium salt tolerance up to 10-25% Without preliminary reclamation of water and soils, the development of processes of salinization, sodium and magnesium alkalinization and sodification of soils is inevitable. It is necessary to regulate the pH of the irrigation water, enrichment with calcium. A leaching irrigation regime is required with ensured drainage, the intensity of which should be correlated with the properties and composition of the soil. A limitation of the composition of agricultural crops and a special set of reclamation measures are required.

Water class	Assessment of water quality	Characteristics
Class IV	Unsatisfactory	Irrigation water has an adverse effect on soil fertility, productivity and quality of agricultural products: reducing the yield of crops with low and medium salt tolerance up to 25-50%. Reclamation of soil and water is required. Water is not suitable without a preliminary change in its qualitative composition or without carrying out special studies of its influence on the quality of agricultural products, on soil fertility, other natural factors.

83. To assess the quality of irrigation water according to the degree of danger of soil salinization, the classification adopted in the recommendations "Assessment of the quality of irrigation water" (**Table I-7**) is used.

Table I-6. Classification for assessing the quality of irrigation water in Tajikistan

Water class	Mineralization of water for irrigation			Assessment of water according to the degree of danger of the development of processes			
	with a heavy texture and soils with SAC> 30 g/l	with an average texture and soils with SAC 15-30 g/l	with light texture and soils with SAC <15 g/l	chloride salinization Cl^-	sodium salt lick Ca^{2+}	magnesium salt lick Mg^{2+}	sodification $(CO^{2-} + HCO^-) - (Ca^{2+}+Mg^{2+})$
I	0.2 – 0.5	0.2 – 0.6	0.2 – 0.7	>2.0	>2.0	>1.0	<1.0
II	0.5 – 0.8	0.6 – 1.0	0.7 – 1.2	2.0–4.0	2.0–1.0	1.0– 0.7	1.0-1.25
III	0.8 – 1.2	1.0 – 1.5	1.2 – 2.0	4.0-10.0	1.0-0.5	0.7-0.4	1.25-2.5
IV	>1.2	>1.5	>2.0	>10.0	<0.5	<0.4	>2.5

Note: 1. Ion concentration is expressed in mg-eq / l.
2. SAC (soil absorption capacity) is the absorption capacity of soils in mg-eq./ 100 g of soil.

84. The noise standards are presented for comparison only. Since the most stringent Tajikistan standards are in some cases far too low to be achievable in practice the criterion should be that noise emissions should not exceed the levels of 3 dB above background levels.

Table I-7. Noise standards

Topic	National Standards/Requirements Tajikistan[3]	EHS Guidelines[16]	Adopted Project Standard	Rationale
Nighttime noise limits for human protection	Noise emissions at the nighttime (23:00-07:00) should not exceed the following levels (SanPin 2.2.4/2.1.8.562-96): ➢ Inside residential and public buildings: • Hospital and sanatorium's wards, and operating rooms: 25 dB(A); • Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 30 dB(A); • Rooms in hotels and hostels: 35 dB(A); ➢ In residential and other areas: • Recreational areas immediately adjoining hospital buildings and health centres: 35 dB(A) • Areas immediately adjoining residential buildings, policlinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries; 45 dB(A); • Areas immediately adjoining hotel and dormitory's buildings: 50 dB (A)	Noise emissions should not exceed the following levels or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site: Outdoor: - Residential; institutional, educational: Nighttime (22:00-07:00): 45 dB(A) - Industrial, commercial: Nighttime (22:00-07:00): 70 dB(A)	Noise emissions should not exceed the levels of 3 dB above background levels	Most stringent Tajikistan standards not achievable in practice
Daytime noise limits for human protection	Noise emissions at the daytime (07:00-23.00) should not exceed the following levels (SanPin 2.2.4/2.1.8.562-96): ➢ Inside residential and public buildings: • Hospital and sanatorium's wards, and operating rooms: 35 dB(A); • Consultation rooms of policlinics, ambulant clinics, dispensers, hospitals, and sanatoria 35 dB (A).	Noise emissions should not exceed the following levels or result in a maximum increase in background levels of 3 dB at the nearest	Noise emissions should not exceed the levels of 3 dB above background levels	Most stringent Tajikistan standards not achievable in practice

[16] See footnote 10.

	• Classrooms, teachers' common room, school and other educational organization's auditoriums conference halls, and public reading rooms 40 dB(A). • Residential rooms in apartments, rest houses, boarding houses, houses for the elderly and disabled, sleeping rooms in kindergartens, and residential schools: 40 dB(A); • Rooms in hotels and hostels: 45 dB(A); • Halls of cafes, restaurants, eating rooms: 55 dB(A); • Shops trade halls, passenger halls in airports and stations, consumer services centres: 60 dB(A); ➢ In residential and other areas: • Recreational areas immediately adjoining hospital buildings and health centres: 45 dB(A) • Areas immediately adjoining residential buildings, policlinics, dispensary, rest houses, homes for the elderly and disabled, kindergartens, schools and other educational institutions, libraries: 55 dB(A); • Areas immediately adjoining hotel and dormitory's buildings: 60 dB (A) • Rest areas at the territory of hospitals and sanatoria 35 dB (A) • Recreation areas at the territory of micro-districts, and residential areas, rest houses, houses for the elderly and disabled, children's playgrounds in kindergartens, schools and other educational institutions: 45 dB (A)	receptor location off-site: Outdoor - Residential; institutional, educational.: Daytime (07:00-22:00): 55 dB(A) - Industrial, commercial: daytime (07:00-22:00): 70 dB (A).		

B. International Conventions

85. The Republic of Tajikistan is a party to many international environmental conventions and protocols. None have any major implications for this Project.

- Vienna Convention for the Protection of the Ozone Layer 1996 and updated:
- Protocol on substances that deplete the ozone layer (Montreal, 1998);
- United Nations (UN) Convention to Combat Desertification (CCD) 1997.
- UN Convention on Biological Diversity (CBD**)** 1997;
- Ramsar Convention (joined in 2000);
- Bonn convention on the conservation of migratory species of wild animals, 2001;
- UN Framework convention on climate change (1998);
- Aarhus Convention (joined in 2001);
- Convention on international trade endangered species wild fauna and flora (CIPS) 2016.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention protection of world cultural and natural heritage (joined in 1992).

C. ADB Safeguards

86. In addition to complying with country safeguards, the Project will also need to comply with ADB SPS which sets out the policies and principles for protecting the environment and people by wherever possible avoiding impacts and mitigating and/or compensating for impacts that cannot be avoided.

87. ADB SPS establishes an environmental review process to ensure that projects undertaken as part of projects funded through ADB are environmentally sound, are designed to operate in line with applicable regulatory requirements, and are not likely to cause significant environment, health, social, or safety hazards.

88. ADB SPS represents the policy in respect of safeguards and avoiding, minimizing, or mitigating adverse impacts on people and the environment. A key output from the environmental assessment process is the EMP that identifies all activities and addresses the potential environmental impacts and risks from the project. Mitigation measures and actions will be commensurate with the project's impact and risks.

89. ADB SPS requires the proponent to disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. The proponent is also required to disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders. The Project is Category B under ADB SPS and the IEE report is disclosed before Board consideration. Updated IEE (if any) and environmental monitoring reports submitted by the implementing agency during project implementation are also disclosed.

D. Health and Safety Guidelines

90. During the design, construction, and operation of a project the ADB SPS requires the borrower to follow environmental standards consistent with good international practice, as reflected in internationally recognized standards such as EHS Guidelines (See footnote 10). EHS Guidelines contain effluent discharge, air emissions, and other numerical guidelines and performance indicators as well as prevention and control approaches that are normally acceptable to ADB and are generally considered to be achievable at reasonable costs by existing technology. When host country regulations differ from these levels and measures, the borrower/client is to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client is required to provide justification for any proposed alternatives. EHS Guidelines include general EHS Guidelines (covering environment; occupational health and safety; and community health and safety) and industry sector guidelines. A comparison between EHS Guidelines values and Tajikistan environment quality or emission standards confirmed that Tajikistan requirements are generally compatible with levels recommended in EHS Guidelines.

II. Description of the Project

A. Overview

91. The Project will modernize prioritized components of the Yovon I&D system. It will increase the capacities of ALRI and WUAs for infrastructure management and water use efficiency. Women farmers will be targeted in all activities. The Project will also increase climate and disaster resilience, water and agricultural productivity and farmer's incomes through three outputs:

(i) **Output 1: Climate and Disaster Resilient I&D infrastructure Modernized**: for the investment project infrastructure works that are essential to maintain the system functional have been identified at main and secondary-tertiary system level: Main system: (a) Earthen Main and Right Branch Canal (85 km) and associated structures including bypass channels and Shurchasoi siphon earthquake-stabilized, adequately sized for climate projections, and modernized for improved flow measurement and control with 2% efficiency gain; (b) Modernized energy efficient pumping installations (#26 and Rassvet #6) benefitting about 3,050 ha; (c) Inspection-farm roads stabilized against erosion with gravel surfacing (125 km); (d) Mechanical workshop renovated and equipped including spare parts; and (e) Erosion mitigation and nature-based solutions implemented to stabilize major gullies and buffer area 792 ha. Secondary-tertiary system: (a) Modernized secondary – tertiary canal and buried pipe systems with volumetric water metering and hydrants that will enable gated pipe connections for dekhan farms, and hose irrigation for homestead areas, installed over four WUAs (9,830 ha), of which at least 12% is land operated by women farmers; and (b) Drainage systems (subsurface/surface) upgraded over 4 WUAs, about 9,830 ha, to address rising water tables and salinity.

(ii) **Output 2: Climate Adaptive Management and Operation of I&D systems strengthened**: at three levels:

ALRI's management, operation, and maintenance improved: (a) Single management entity established by ALRI able to manage modern flow control and remote monitoring systems for improved services to WUAs/ farmers, quick shut down of system in case of disasters, and also a new digitized asset management database; (b) GIS remote sensing system established for spatial monitoring for major crops (cotton, wheat, other).

WUA's management, operation and maintenance improved: (a) Union of WUAs established to provide specialized maintenance and training services to members and operate joint stores depot and workshop; (b) Cashless payment system established through local banks for the modernized core area (4 WUAs, 9,830 ha) with volumetric metering and at least 90% collection efficiency achieved; and (c) Erosion mitigation and nature-based solutions implemented to stabilize and reclaim minor gullies, 500 ha.

Farm level and homestead irrigation practices and productivity improved: (a) Higher value diversified cropping with integrated pest management (IPM) and integrated nutrient management (INM) with data informed decisions for crop choice and marketing, and improved practices to achieve higher crop yields less vulnerable to drought/intense storm events; (b) Improved crop water productivity with precision grading for 1,500 ha, and adoption of gated pipe for 300 ha, including for at least 12% land operated by women farmers; (c) Labor and water efficient high value crop homestead irrigation systems adopted and managed by women over 300 ha, including hose/micro-irrigation; (d) Women participate actively in WUAs with improved representation on WUA committees; (e) Mardikor groups supported through capacity building, enterprise development, and with tools and equipment for labor efficiency and livelihood gains; and (f) Women dekhan farmers supported through capacity building, equipment for production, and enterprise development.

(iii) **Output 3: Policy strengthened for sustainable water management**: Financing policies reviewed, and reform options identified for climate adaptive and sustainable O&M, Gender policies and women's participation in ALRI and WUAs reviewed.

92. The Yovon scheme's I&D facilities are badly deteriorated after 50 years of service. Sections of the system have been abandoned, water control is significantly reduced, and water wastage is high. The strategy of incremental repairs employed so far is no longer advisable.

93. This project is Phase 1 of investment projects for the upgrading and modernization of the scheme that will restore some of the lost control at both main system and secondary- tertiary levels, improve the stability and safety of bypass canals, and introduce elements of modernization in the form of new technologies that were unavailable when the system was designed and constructed in the late 1960s and early 1970s.

94. The irrigation system is designed with three levels of water delivery;

(i) The primary system consists of major canals and bypass canals.

(ii) The secondary system consists of off-takes to risers and hydrants that connect from the canals to sections of buried pipelines for delivery of water for irrigation at the farms.

(iii) The tertiary system connects individual farms from manifolds at the ends of the secondary system to the individual farms and homesteads.

95. Primary system upgrading will restore the carrying capacity of major canals by desilting and resectioning, accompanied by selective lining of bypass canals. At the secondary - tertiary level, in four selected WUA areas, the project will replace failed sections of buried pipelines, clean and desilt existing pipelines, and install new risers and modern hydrants for water delivery to farmers. Importantly, pipelines which currently discharge unused irrigation water to waterways which flow to the rivers draining the valleys, will be closed so that there are only controlled releases from their outfalls, as required for periodic pipeline flushing.

96. Two of the system's six primary (first stage lift) pumping stations will be upgraded and modernized with more efficient variable speed pumps and controllers to reduce electricity consumption and improve volume and reliability of water supply to their command areas.

97. Subsurface drainage is as important for high-production agriculture as irrigation supply in many areas of the system. Subsurface drains in the selected areas will be cleaned to remove silt blockages and collapsed sections will be replaced with new slotted (HDPE) pipes. Outfalls will be improved to reduce erosion including gabion protection to prevent damage in future.

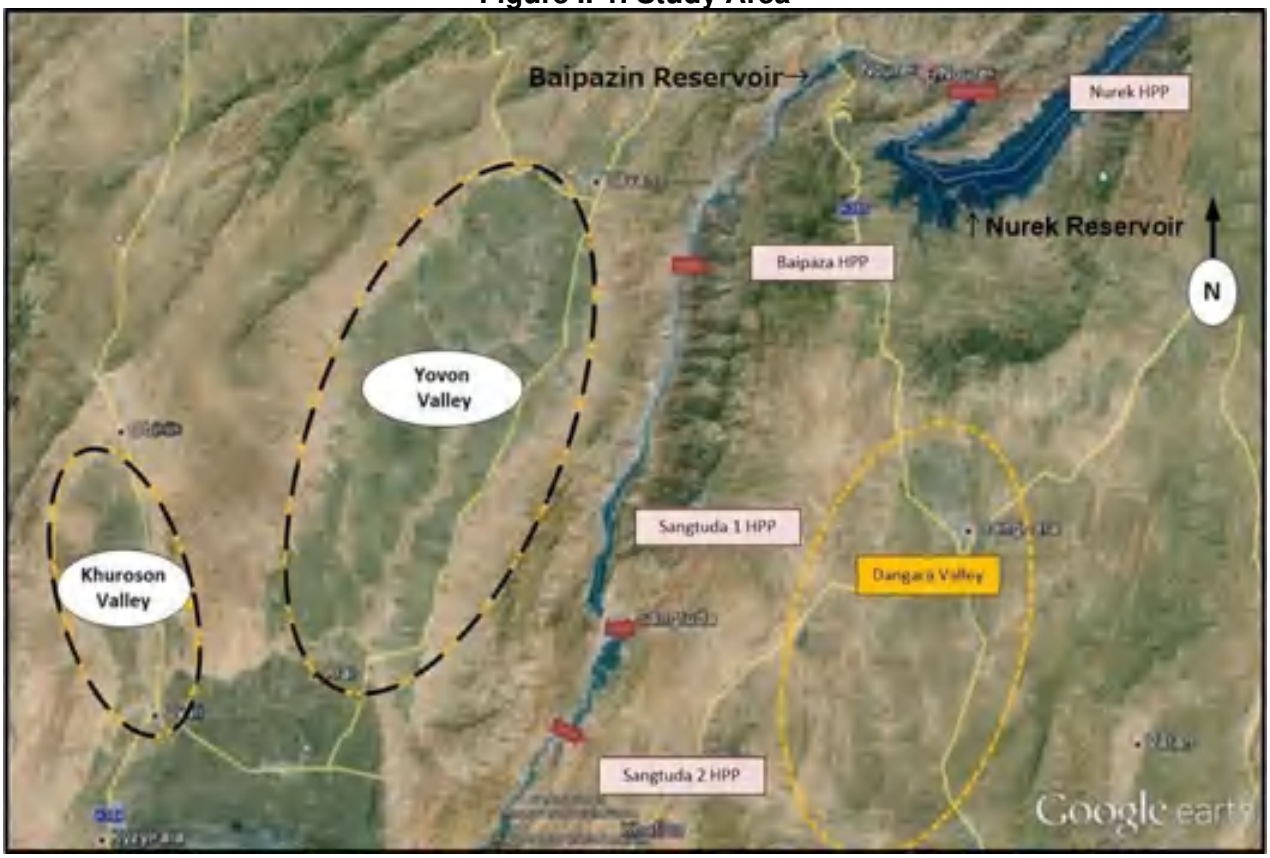
98. Modernization elements included in the redesign are primarily aimed at increasing the availability of information related to irrigation water flows and deliveries to facilitate better, data-based decision making, and more efficient system operation. At main system level, this comprises the installation of a Supervisory Control and Data Acquisition (SCADA) system across the entire main system, including both improved and unimproved sections.

99. The total or gross command area extends over 56,604 ha. The net irrigable command area is about 40,355 ha comprising 34,220 ha of Dehkan farmland and 6,135 ha of homestead irrigated land. Of this net command area, 23,626 ha (59%) is irrigated by gravity flow from the main canal system, and 16,729 ha (41%) is lift irrigated by cascades of pumping systems.

B. Location and irrigation scheme and description

100. The subject area for the Yovon scheme extends over parts of three districts, Yovon, A. Jomi and Khuroson in Khatlon Province, and over two valleys, the Yovon and Khuroson Valley. The subject (study) areas are shown in **Figure II-1**.

Figure II-1. Study Area



Source: Consultants after World Bank

101. The Yovon scheme infrastructure includes: (i) primary main and branch canals and associated structures, (ii) pumping systems, (iii) secondary and tertiary distribution systems, (iv) drainage system, (v) escape / spill and mudflow channels, (vi) inspection and farm roads, and (vii) field systems.

102. The scheme was built in stages, from the mid-1960s to early 1980s, to a high standard incorporating: (i) earthen channels for main channels following close to the contours and most of the secondary canals, (ii) precast parabolic sections (flumes) for the down-sloping secondary canals, and (iii) buried asbestos cement pipelines for tertiary irrigation distribution and for sub-surface drainage. To irrigate terraces above the branch canals, pumping stations lift water in several lifts, pumping water up to 300m above the branch canals into secondary canals.

103. Some parts of the I&D systems have reached the end of their design life: (i) most of the steel pipelines are no longer safe to use (risk of pipe burst) and two of three large siphons have already been replaced, (ii) steel gates and screens are in poor condition, or non-operable, and need to be replaced, (iii) spill/ escape / mud flow channels and many of the cross drainage structures are failing, (iv) many of the pumping stations are dilapidated and energy inefficient, (v) parts of the down-sloping pre-cast parabolic secondary canals have subsided, and joints leak, (vi) the tertiary buried asbestos pipe distribution systems have partially failed and all above-ground steel hydrants need to be replaced, (vii) about 50% of the asbestos pipe subsurface drainage system is blocked/ dysfunctional, and (viii) outfall structures have failed resulting in gully formation at the tail ends of I&D systems.

104. While much of the system reaching the end of its design life, it would be wasteful to replace elements that may continue to provide service for many more years with some investment to upgrade them. For example, the canals and canal structures should be retained with sediment removed to restore capacity, failed pre-cast parabolic sections of downslope secondary canals may be replaced and joints

resealed, selective lining can be provided for stability of earthen canal sections, and all rusted steel gates, screens and hydrants replaced.

105. Preliminary investigations indicate that some of the asbestos cement pipes used at the tertiary level for both the irrigation and sub-surface drainage systems may continue to be safely used for many years, with selective replacement of failed sections with new (HDPE) pipes. However, complete replacement of hydrants and control valves is envisaged. Where steel pipes have been used, these will need to be replaced, with new HDPE pipes if buried, but with steel where above ground.

106. The key issues from an asbestos management viewpoint are (i) whether there is asbestos in other cement or other facilities, (ii) how many locations will require work with asbestos, (iii) how to protect health of workers, (iv) how to join old asbestos pipes to new HDPE pipes of hydrants and control valves without liberating asbestos fibers, and (v) how to dispose of asbestos waste in an manner acceptable to the authorities in line with good international practice, without further risk to the environment, workers or public. Otherwise, the environmental impacts from other construction work proposed should be very manageable and impacts should be temporary and generally reversible. Residual impacts should be well within acceptable levels.

107. The Yovon scheme comprises two tunnels, one short main canal and two long branch canals. The secondary irrigation is connected to these supplies. The scheme is supplied with water from the reservoir on the Vakhsk River through the 7.4 km long Vakhsh Tunnel diverting water from the Vakhsh River to the Yovon valley. The Vakhsh Tunnel discharges into the lined main canal where a regulator complex controls flow to the Left and Right branch canals, and to an escape channel leading down to the Yovon river.

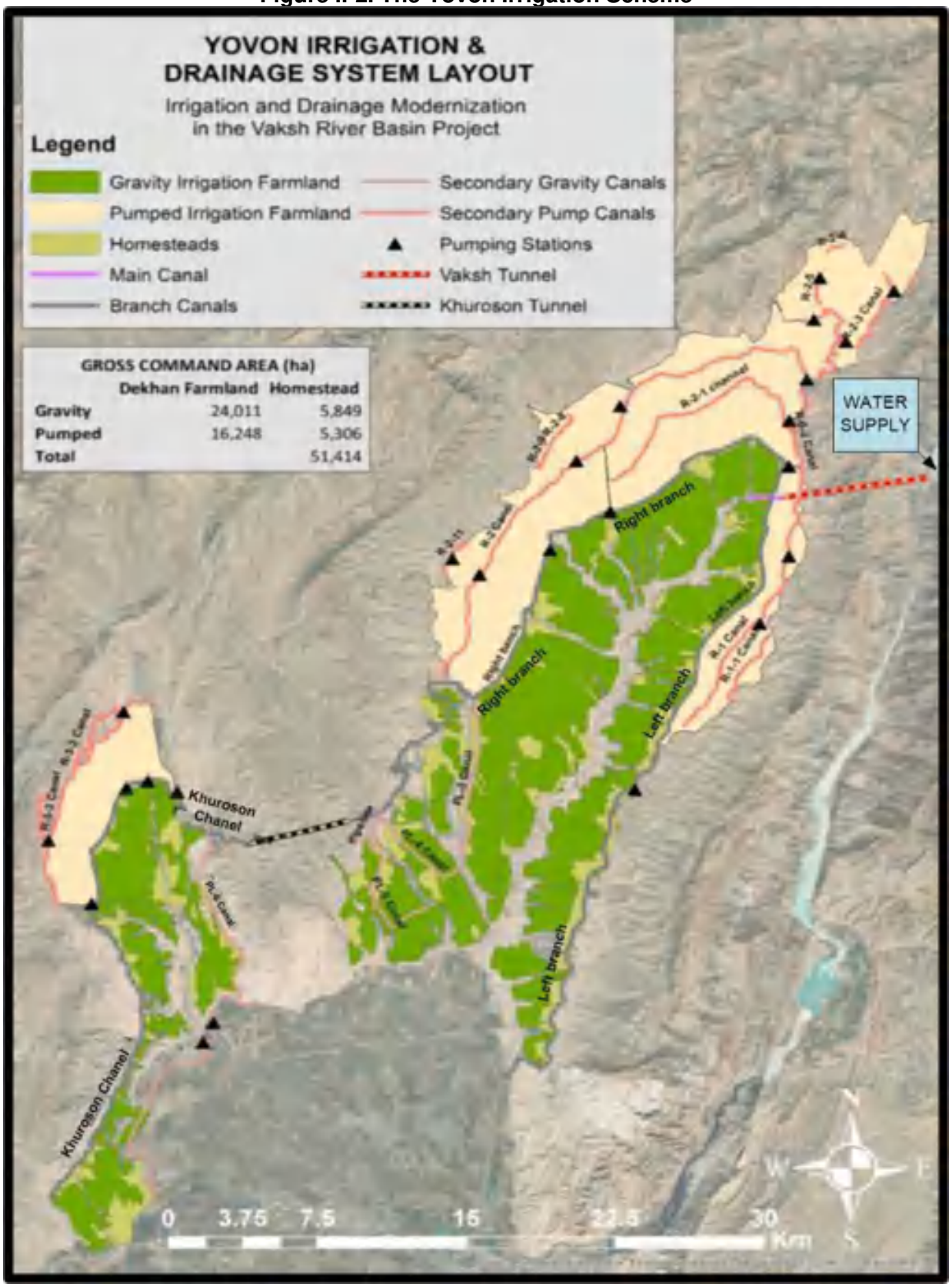
108. The Left Branch canal flows along the east side of the Yovon valley with a spillway near its tail end to release excess supply down to the Yovon River (**Figure II-2**).

109. The Right Branch canal follows the contour around the north west Yovon valley to Yovon and A. Jomi on the north west riverbank. Three siphons transfer water over side valleys. The flow is conveyed to the neighboring Khuroson Valley though the Khuroson Tunnel. At the end of the tunnel, the Right Branch (known from here as Khuroson canal) continues north and west to the head of the Khuroson valley to supply that area. Another secondary canal, PL-6, takes water to the left side of the Khuroson valley. The irrigation layout is shown in **Figure II-2**.

110. In Khuroson valley, about 64% of the area is irrigated by gravity and about 36% is pumped with four functioning pumping stations, two of which are managed by private sector companies for orchards / vineyards, and two by ALRI.

111. ALRI's district Land Reclamation and Irrigation Division (LRID) manages water distribution along the main and branch canals, as well as most of the pumping stations, while secondary-tertiary water distribution is managed by 17 WUAs and, for 2,233 ha in A. Jomi, by the Bahoriston Canal agency.

Figure II-2. The Yovon Irrigation Scheme



Source: Consultants O&M Plan May 2021

C. Structures

112. There are 162 structures along the Right Branch and 156 along the smaller left branch (**Table II-1**). There are no secondary canals or functional pumping stations along the Left Branch, and the left branch structures comprise a larger number of direct offtakes to tertiary pipes. There are also 56 bridges along the Left Branch and 29 for the Right Branch.

Table II-1. Number of Structures along the Branch Canals

Structures along Branch Canals	Right Branch	Left Branch	Total
Head Regulator	1	1	2
Regulator	3	2	5
Offtake	105	94	143
Tunnel	1	0	1
Hydro post	5	2	7
Spillways	5	1	6
Duker (Siphon)	2	0	2
Aqueduct	3	0	3
Siphon	8	0	8
Bridges	29	56	85
Total	**162**	**156**	**262**

113. In addition to the major (aqueduct, siphon and tunnel) structures, and the six first stage (lift) pumping stations, there are: (i) three Cross Regulators along the Branch (ii) Head Regulators controlling flows to four secondary canals / pipelines, (including PL3, PL4, PL5, PL6) and escape channels, (iii) about 105 Gated Turnouts supplying 250-400 mm diameter downslope buried pipe systems, and (v) 29 road bridges. There are also six hydro posts (gauges) to monitor water levels and flows along the Branch canal.

114. The three inverted (double) steel pipe siphons along the main canal were built to carry the branch canal flow under tributary valleys. The first two siphons, Ishmasoy and Loikasoi, starting at KM 27.26 and KM 35.66 respectively, are now not functional and 4.6 km and 4.2 km long by-pass channels have been constructed instead. These were only meant as temporary canals and are now in danger of failing due to seepage and slope failure of the steeply sloping terraces.

D. Pumping Systems

115. There are pumping stations lifting water from the Right Branch of the Yovon scheme, in both Yovon and Khuroson Districts (**Figure II-2**). The pumping stations and lift irrigation systems were built from the 1960s to 1990s depending on the area.

116. All the early pumping stations pumped water up to Secondary canals in the higher lying terraces. The few privately managed pumping stations, in Khuroson District, were built in the 1990s for orchard irrigation, and pump directly into pipelines to irrigate orchard areas of 200 - 300 ha.

117. The majority of the pumping stations are still functional, but not at design capacity due to dilapidations of pump sets. However, some crop requirements can be met. Four of the smaller pumping stations (#14 and #24 in Yovon district and #19 and #20 in Khuroson) are no longer operational and their command areas are no longer irrigated.

E. Proposed project interventions

118. Many of these structure and pumping facilities will eventually, to a greater or lesser degree require repairs, upgrading, or replacement. The financing for the infrastructure works in this project that are essential to maintain the functional scheme have been identified at main and secondary-tertiary system level.

119. In the Primary System, the interventions proposed are:

(i) Improvements to 85 km of the Earthen Main and Right Branch Canal and associated structures including bypass channels and Struchasoi siphon, earthquake-stabilized, adequately sized for climate projections, and modernized for improved flow measurement and control.
(ii) Modernized energy efficient pumping installations (at PS #26 and PS Rassvet #6) benefitting about 3,050 ha.
(iii) Inspection-farm roads stabilized against erosion with gravel surfacing (125 km).
(iv) Renovation of mechanical workshop and reequipped including with spare parts; and
(v) Erosion mitigation and nature-based solutions implemented to stabilize major gullies and buffer area 792 ha.

120. In the Secondary-tertiary system, the interventions proposed are:

(i) Modernized secondary – tertiary canal and buried pipe systems with volumetric water metering and hydrants that will enable gated pipe connections for dekhan farms, and hose irrigation for homestead areas, installed over four WUAs (9,830 ha), of which at least 12% is land operated by women farmers, and
(ii) Drainage systems (sub-surface and surface) upgraded over 4 WUAs (9,830 ha) to address rising water tables and salinity to combat poor drainage and sustained water logging of soil that causes salt levels build up in the soil, causing stress to crops.[17]

[17] Irrigation Innovation Consortium: https://irrigationinnovation.org/ag-water-faqs/drainage-and-salinity/#A6

Figure II-3. Photos of Canals and Structures

Photo 1. Right Branch Loikasai Bypass Channel – lining required.

Photo 2. Outlet from Right Branch underwater as canal water level is raised high to try and convey required flow

Photo 3. Aqueduct 140 m long and design capacity of 50 m^3/s. Main problems are holes in troughs and scouring out of foundations for some of the supporting pillars.

Photo 4. Check (cross regulator) Gates cannot be operated manually, and motors are broken. A truck crane is used. Gates and gate bearings need replacement.

Photo 5. Gauging Station along Right Branch

Photo 6. Flume or “Gravity” secondary canals leading from Right Branch comprise mostly pre-cast concrete flumes, some of which have now subsided and failed.

Figure II-4. Photos of Siphons and Bypass Canals

Photo 7. Non-functional Ishmasoy Siphon (No. 1) comprising two steel pipes at 38.1568N, 68.8603E, and the 4.6km long earthen bypass canal

Photo 8. The bypass channels are unlined and seepage and small slip failures were observed in the downside slopes, February 2020.

Photo 9. Non-functional Loikasoi Siphon (No. 2) comprising two Steel pipes 590 m long at 38°8'01"N, 68°49'54"E, and the 4.1 km long bypass canal. Lining required.

Photo 10. Short length of lining being constructed by ALRI in part of Loikasoi Siphon 2 bypass channel, February 2020.

Photo 11. Shurchasoy Siphon 3 (1 No steel pipe and 1 new glass reinforced plastic (GRP) pipe). Either: (i) Construction of new bypass canal proposed, or (ii) a second siphon pipeline required. Capacity to be increased from 9-10 m^3/s to 13-15 m^3/s.

Figure II-5. Photos Pumping Stations


Photo 12 and Photo 13. PS #5. Constructed in 1968. 4 pumping units (1 small) 50% functional as 1 pump and 2 motors not operable; pressure pipeline deteriorated, electric cabling in poor condition.


Photo 14 and Photo 15. PS #12. Constructed in 1976. 4 pumping units. 75% functional as 1 pump and 1 motor not operable, as well as valves; pressure pipeline deteriorated.


Photo 16 and Photo 17. PS Rassvet #6" Constructed in 1972. 4 pumping units. 50% functional as 2 pumps not operable, as well as valves; 1,630 m long, 1,220 mm diameter steel pressure pipeline deteriorated.

III. Analysis of Alternatives

121. During feasibility stage, alternatives were examined to determine the most financially and technically feasible way of achieving the project objectives. The essential elements of the local I&D infrastructure were established many years ago and the proposals for improvement and their potential environmental and social impacts were also considered during consultations with the managing authorities (including ALRI and WUAs).

1. No Project Alternative

122. If the project is not implemented, the Yovon and Khuronon irrigation systems water supply capacity and efficiency will continue to decline. Agriculture productivity will be suppressed, capacity for water resources management (WRM) will not be improved, infrastructure will not be modernized, and farm management and water use capacities will not be improved. Overall, farm incomes in the Yovon and Khuronon valleys of the Vakhsh River Basin will not be improved. For these reasons, the "No Project Alternative" is not considered acceptable.

2. Justification

123. The Yovon scheme extends over Yovon, A. Jomi, and Khuroson in Khatlon Province with irrigable area of 40,355 ha. The Yovon system is 50 years old and has had limited maintenance but some emergency and more major works, such as: (i) the construction of bypass channels to replace old steel pipe siphons, (ii) new glass reinforced plastic (GRP) pipe siphon at Shurchasoi, and (iii) for upgrading of two pumping stations. The funding was limited and the available funding for the proposed works is insufficient to cover the full scheme. The cost of a comprehensive modernization of the entire Yovon scheme is estimated at $7 million, which is about three times the funding potential of the available grant. Therefore, the project will invest in works and activities aimed at removing the main obstacles and risks and bring maximum benefits to all farmers and rural communities.

3. Preferred option for irrigation and drainage (I&D) system

124. Modernization of the existing system is far more cost effective than construction of a new system. The rationale for selecting the pattern and extent of modernization takes into account that addressing engineering, institutional and other constraints for the whole area would cost far more than the grant funds available for the Project. The proposal under the proposed investment project (Phase 1) is therefore for cost effective modernization in a limited area to address climate and earthquake hazards and improve farmers livelihoods through: (i) critical engineering works for the main system managed by ALRI, (ii) modernizing a core (gravity supplied) WUA managed area, and (iii) support for various institutional and management interventions. These gains can be consolidated and extended to the whole scheme area under one or more future projects (Phase 2). The outcome of the Project is enhanced climate and disaster resilience, water productivity and income of farmers in selected areas of Yovon I&D system.

125. The engineering studies have examined alternatives to the project's design, technology, and components, however, there are no alternatives to the location as the Project infrastructure is fixed. The alternatives revolve around what to replace and which sections of the infrastructure to improve. These will be reconfirmed in the detailed designs.

126. The target area for Phase 1 is in the central portion of the Yovon scheme; considered optimal and most appropriate to utilize the existing infrastructure, essential work to improve and keep the system functioning and consolidate with work carried out so far on other elements of the system. The detailed designs will be made at a later stage by the PIC.

127. Environmental impacts from modernization of the existing system will be less than construction of a new system in terms of land required, dust and noise during construction, and disruption of irrigation services. Likewise, the introduction and use of new technologies, such as sprinkler irrigation, drip

irrigation, will help to reduce soil erosion, reduce secondary salinization, and reduce loss nutrients from fertile soil layers from excessive irrigation. The introduction of these technologies as an alternative to replacing the old drainage network will avoid unnecessary excavations that would mix fertile layers with the subsoil and potential crop losses.

4. Pumping Station Upgrading

128. Pump stations could be demolished and completely reconstructed. However, although equipment needs to be replaced, the buildings in Yovon area are in relatively good shape, and only require repairs. Therefore the option to upgrade the stations and replace equipment rather than reconstruct pumping stations is preferred.

5. Alternatives for asbestos management

129. A key environmental issue and technical consideration with environmental consequences is whether or not to remove and replace the asbestos-cement I&D pipes. However, despite its age, much of this pipe system is currently reported to be in a serviceable condition and therefore wholesale replacement is not necessary. Based on observation, it is believed that flushing, clearing blockages therefore achieving improvement of water flow of the existing buried asbestos-cement pipes can be achieved for much of the pipework; therefore conserving funding for a greater portion of the system.

130. This approach to ACM will not only require measures for safe handling and disposal of ACM pipes that need to be replaced but prior to that, a better determination of all ACM materials needs to take place and a full AIR and AMP must be compiled at the detailed design stage for all elements of the Project; that may contain potential ACM. A preliminary AMP (**Annex 1**) has been prepared in this IEE, based on observation. One alternative would be to conduct the AIR scrutiny right away. However, since the exact extent of the Project interventions will not be known until the detailed design stage, it is appropriate that the AIR can be compiled, and AMP updated at the commencement of the detailed design stage and updated as necessary as the detailed designs are completed. The details of the AMP are presented under the EMP in the IEE, and the minimum requirements of the AMP will be a requirement of the contract.

131. Technical alternatives for management of ACM have been considered during the development of the proposed interventions. Where ACM materials are identified and cannot be brought into a serviceable condition, where buried, they may be labelled, marked, and abandoned in situ.[18] Short sections and any already broken pieces at the surface would be removed, wrapped, and sealed for delivery and burial at a disposal site acceptable to the authorities. At this stage, it is not envisaged that ACM pipes to be abandoned deep underground would be excavated for disposal elsewhere as this would cause unnecessary work, exposure risk to workers and increase the disposal problem with no net environmental benefit.

132. Locations for ACM disposal must be acceptable to the CEP and local authorities and the local community. The locations must be monitored to ensure the disposed ACM remain undisturbed.

133. Serviceable sections of ACM pipe must be reconnected to new HDPE or steel pipes at numerous but as yet undefined locations (subject to detailed designs) as the pipes will comprise much of the I&D systems at the secondary and tertiary level. The ACM is currently low risk as the asbestos is bound in the cement matrix of the pipes and cannot be liberated to air easily. However, the ACM pipes must not be cut with power tools as this alternative creates a much higher risk of asbestos fiber release, which is difficult to control by unskilled contractors. The alternative is to join the old to new pipes with flexible sealable sleeves and the AMP provides one methodology to accomplish this with minimum release of asbestos fibers from the ACM. Alternatives could be considered at the detailed design stage, but they will need to demonstrate that they can achieve equivalent control over ACM, or better, as the proposal made in the AMP in this IEE.

[18] Asbestos Safety and Eradication Agency, Asbestos Cement Water and Sewer Pipe Guidelines www.asbestos.nt.gov.au

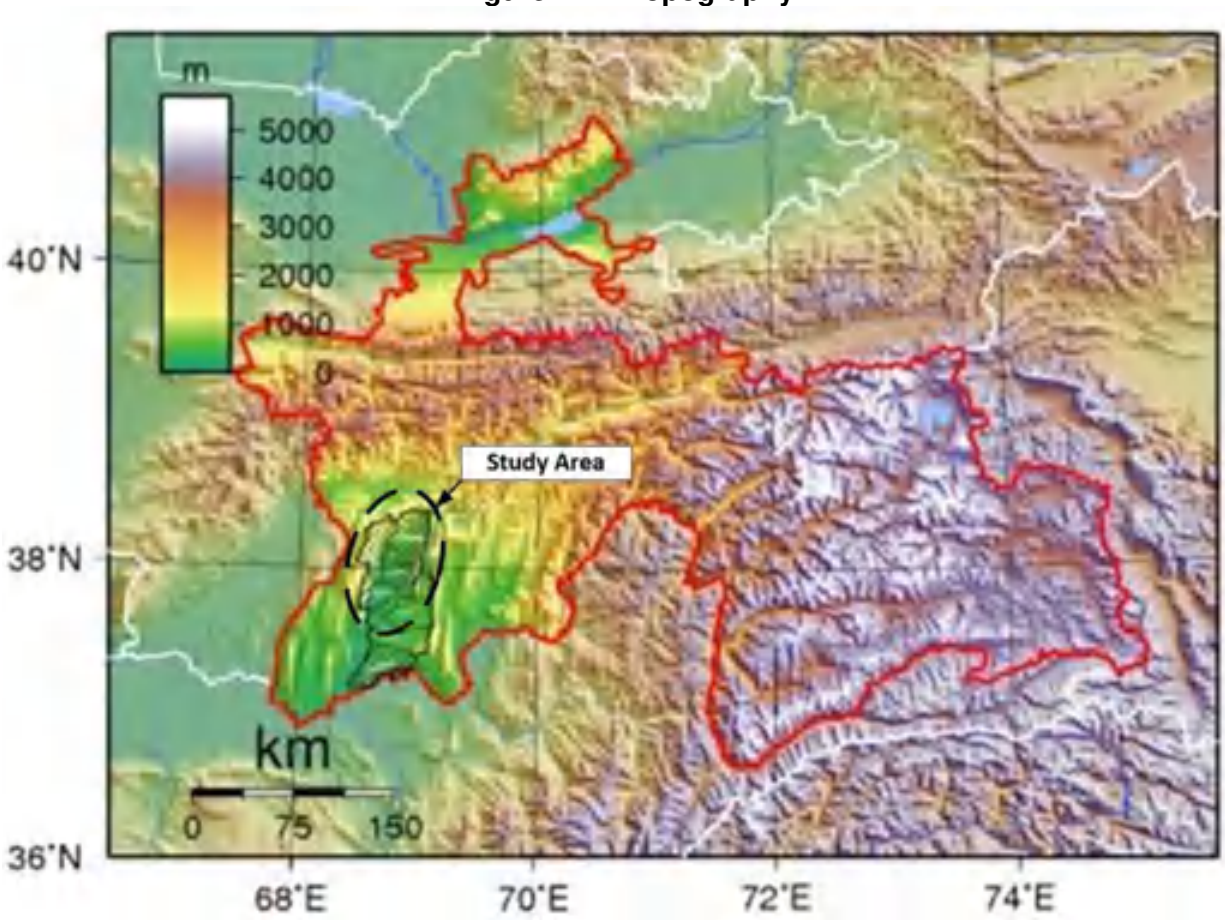
IV. Description of the Environment (Baseline Data)

A. Physical resources

1. Topography

134. Tajikistan is a typically mountainous country with absolute surface heights ranging from 300 to 7,495 m. 93% of its territory is occupied by low-lying areas located in the river valleys in the South-West and in the far North, where a chain of territory extends to the Ferghana valley. Due to the mountainous nature of the area, only 5% of the territory of Tajikistan is arable land.

Figure IV-1. Topography



135. The command area of the Yovon Irrigation System is in the Yovon and A. Jomi districts, located in the valleys of the Yovon and Vakhsh rivers, while the Khuroson district occupies the mountainous and foothill parts of the Aktau ridge. The command area of the Kumsangir Irrigation System in the districts: Vakhsh, Jaloliddini Balkhi (Jaloliddini Rumi) and Jaikhun (Kumsangir) are in the Vakhsh valley.

136. The Yovon and Khuroson valleys are located in the areas of the Northern part of the Tajik depression. To the south is the Vakhsh river. The River Yovon bisects the Yovon and A. Jomi districts. There are mountains on three sides. To the East is the Karatau ridge and further east is the River Vakhsh. To the West are the mountains of Jetimtau and north spur of the Rangatau ridge.

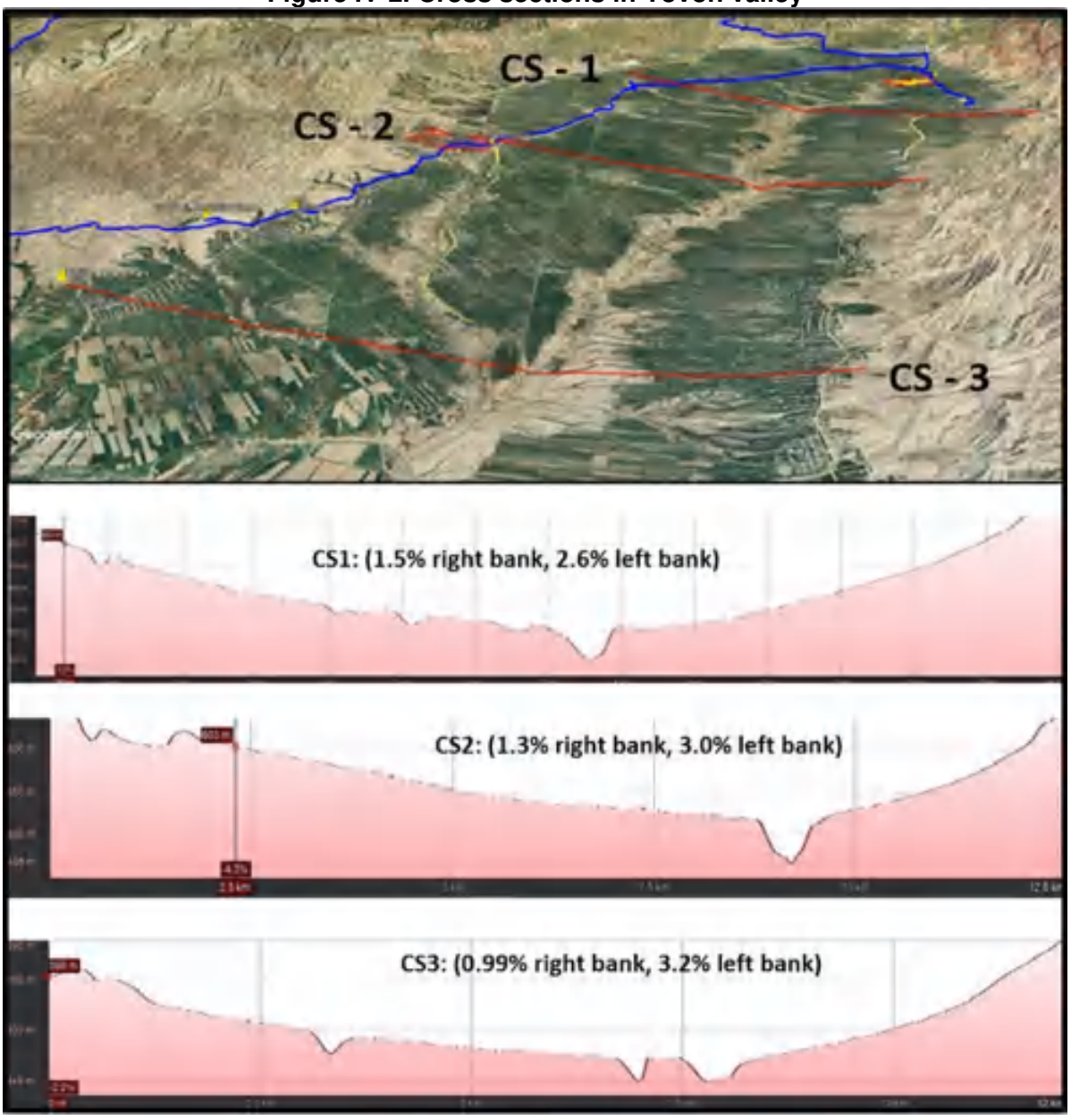
2. Ground elevation and slopes

137. The ground elevation at the project area ranges from approximately + 450 m at the end of the

Khuroson Valley to approximately +850 m at the head of the Yovon valley (**Figure IV-2**).

138. The width of the Yovon Valley is about 13 km, and the land slopes on the east (left) bank terraces range from 2.6 to 3.2 % and from 0.99 to 1.5 % on the west (right) bank. The Yovon River, and its tributaries are seasonal and meander in eroded canals up to 0.5 km wide, lying below the adjacent irrigated terraces. A similar range of slopes is found in the Khuroson Valley.

Figure IV-2. Cross sections in Yovon valley



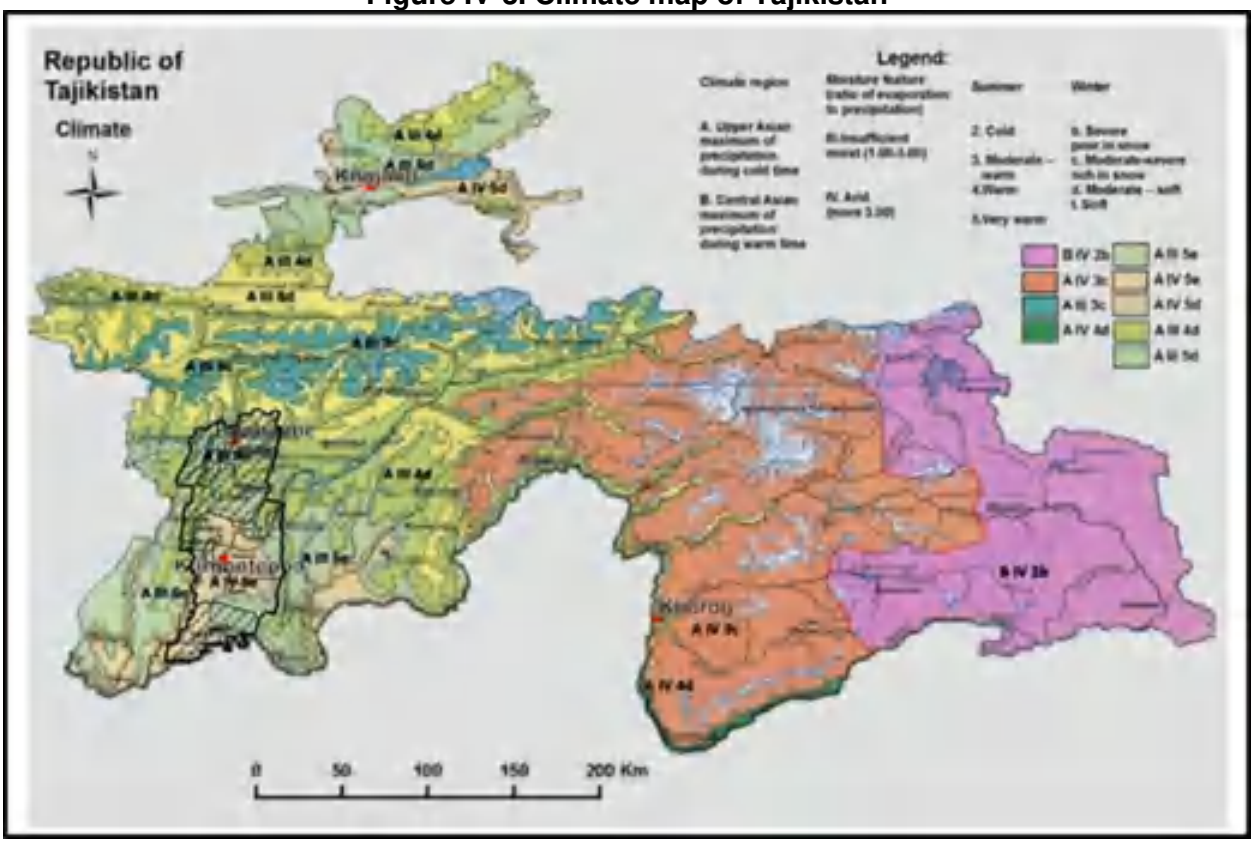
Source: Inception report including preliminary assessments, outline of proposed project and planning for the feasibility, advanced detailed design and safeguard studies

3. Climate

c. General climate

139. The climate of Tajikistan is sharply continental, with large seasonal and daily fluctuations in temperature and air humidity. The complex mountain formations cause the unusual local meteorological conditions with large differences in temperatures. The amount of precipitation depends on the location and orientation of the mountain slopes and the circulation of air masses. (**Figure IV-3**).

Figure IV-3. Climate map of Tajikistan



140. In valleys and plains (up to 500 m), the average July temperature is from 23 ℃ in the north to 30 ℃ in the south, in January from -1 ℃ in the north to 3 ℃ in the south. Precipitation is 150-300 mm per year. In the valleys of the Khatlon region of Tajikistan from the south, warm dry air masses periodically invade in winter and hot dry air. On summer days, around 45-46 ℃ is typical, while the soil, if it is devoid of vegetation, heats up to 72-73 ℃. In such thermal conditions, subtropical crops are threatened with overheating.

141. In the Khatlon region, evaporation significantly exceeds precipitation. Natural soil moisture is not enough for the effective cultivation of most agricultural crops. Therefore, in Khatlon region, more than 90 % of crop production is carried out under irrigated agriculture, where irrigation is the main factor in increasing the productivity of reclaimed lands and the ecological and economic efficiency of the reclamation and irrigation potential of the arid region. Temperature and rainfall data for the project area are presented in

142. **Table IV-1**.

Table IV-1. Temperature and precipitation in the project districts

District	Month	Avg. High Temperature	Avg. Low Temperature	Avg. Annual Temperature	Annual Precipitation
Yovon	January	22 - 26 ℃	-3.3 ℃	17.1 ℃	120 - 620 mm
	July	31 - 45 ℃	18 - 20 ℃		
Khuroson	January	22 - 25 ℃	-3.5 ℃	16.5 ℃	150 - 686 mm
	July	40 - 42 ℃	18 - 20 ℃		
A. Djami	January	22 - 25 ℃	-2.2 ℃	17.5 ℃	50 - 193 mm
	July	40 - 45 ℃	22 - 28 ℃		

Source: Tajikistan National Agency for Hydrometeorology

143. The maximum average temperature is reached in July. The average maximum temperature rises to about 31.0 ℃ (the average maximum daily temperature in July). Annual precipitation is approximately 281 mm, with 96% of this amount falling between November and May. The rest of the months remain dry and hot with very little rainfall, so agriculture is highly dependent on canal water. In dry months, humidity drops below 50%. Average wind speed varies from 123 km / day to 228 km / day.

144. The climate in the Yovon Valley is not humid enough and is very hot in summer and mild in spring. The average long-term data for Yovon meteorological station are given in **Table IV-2**.

Table IV-2. Average climate data from the Yovon weather station

Parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	The average /Total
Average ℃	2.1	5.3	10.5	16.5	21.5	27.5	31.0	29.6	24.3	17.2	10.5	5.5	16.6
Absolute min temp ℃	-26	-24	-14	-6	6	8	16	12	5	-3	-17	-22	-26
Absolute max temp ℃	22	25	34	36	40	44	45	45	41	37	33	26	45
Number of days with strong wind	0.2	0.2	0.5	0.6	0.7	1.6	0.5	0	0	0	0.1	0.4	5
Humidity %	81	77	72	68	52	41	43	33	44	66	70	82	61
Wind km/c	162	207	228	208	200	183	156	158	123	132	142	154	171
Sundial	3.8	4.7	5	6.8	8.7	10.2	12.8	11.5	10	7.6	5.6	4	7.6
Precipitation	82	85	123	119	80	21	0	0	0	24	57	72	663

Source: Vodkhoz of Yovon District

d. Climate change

145. Climate change has been identified as a growing threat to the environment in Tajikistan. The greatest concern is the rise in air temperature, which has serious consequences for its glaciers and water resources. Surface air temperatures have risen in most areas and altitudes. The largest increase in the average annual temperature was recorded in Dangar at 1.2 ℃ and Dushanbe at 1.0 ℃ over a 65-year period. In mountainous areas, 1.0-1.2 ℃ was observed in Khovaling, Faizabad and Iskashim.

146. Since 2014, ADB has required all investment projects to take into account the risk of climate change and natural disasters, and to include adaptation measures in projects at risk from geophysical factors and climate change. **Table IV-6** shows the main potential climate change sensitivities for possible components of an irrigation modernization project. The last row in the table refers to the potential sensitivity associated with upstream water balance changes. Other lines refer to the sensitivity to climate change in the project area itself.

147. **Table IV-3** summarizes hydrological responses to forecasts of climate change in the Amu Darya basin. Predictions for the next 30 years differ on the hydrological response to climate change in the Amu Darya basin. Twelve studies predict that there will be a moderate to severe decrease in flow volumes over the next half century, while two studies predict an increase in flow.

148. All studies generally agree that there will be a shift in maximum water discharge at the start of the season as the buffering effect of snow and glaciers becomes less dominant. Even in scenarios that predict increased flows, peak displacement is predicted. Thus, usually a decrease in flows is expected in the second half of the year, especially in the summer months (August, September, October), following an increase in the earlier part of the year.

149. How this seasonal shift spreads to the project site depends mainly on the operation of the Nurek reservoir (for electricity and irrigation) and possibly also on the planned Rogun Dam on the river above. In addition to volume and seasonal changes, inter annual variability may also increase due to climate change as the buffering effect of glaciers decreases throughout the year.

Table IV-3. Change predicted in Amu Darya flows

Changes	Number of studies	References
Next 30 years (< 2050)		
Small increase up to + 10%	2	(World Bank, 2015) (Kayumov and Novikov, 2014)
Slight reduction to -10%	2	(Kure et al., 2013b, 2013a) (Taryanikova, 2016)
Decrease between -10% to -40%	3	(Aus der Beek et al., 2011) (Immerzeel et al., 2012; Lutz et al., 2012) (Mannig et al., 2018)
Second half of the century (> 2050)		
Small increase up to +10%	0	
Slight reduction to -10%	2	(World Bank, 2015) (Kayumov and Novikov, 2014)
Decrease between -10% to -40%	5	(Aus der Beek et al., 2011); (Kure et al., 2013b, 2013a); (White et al., 2014); (Taryanikova, 2016); (Mannig et al., 2018)

Source: Inception report including preliminary assessments, outline of proposed project and planning for the feasibility, advanced detailed design and safeguard studies

4. Geology

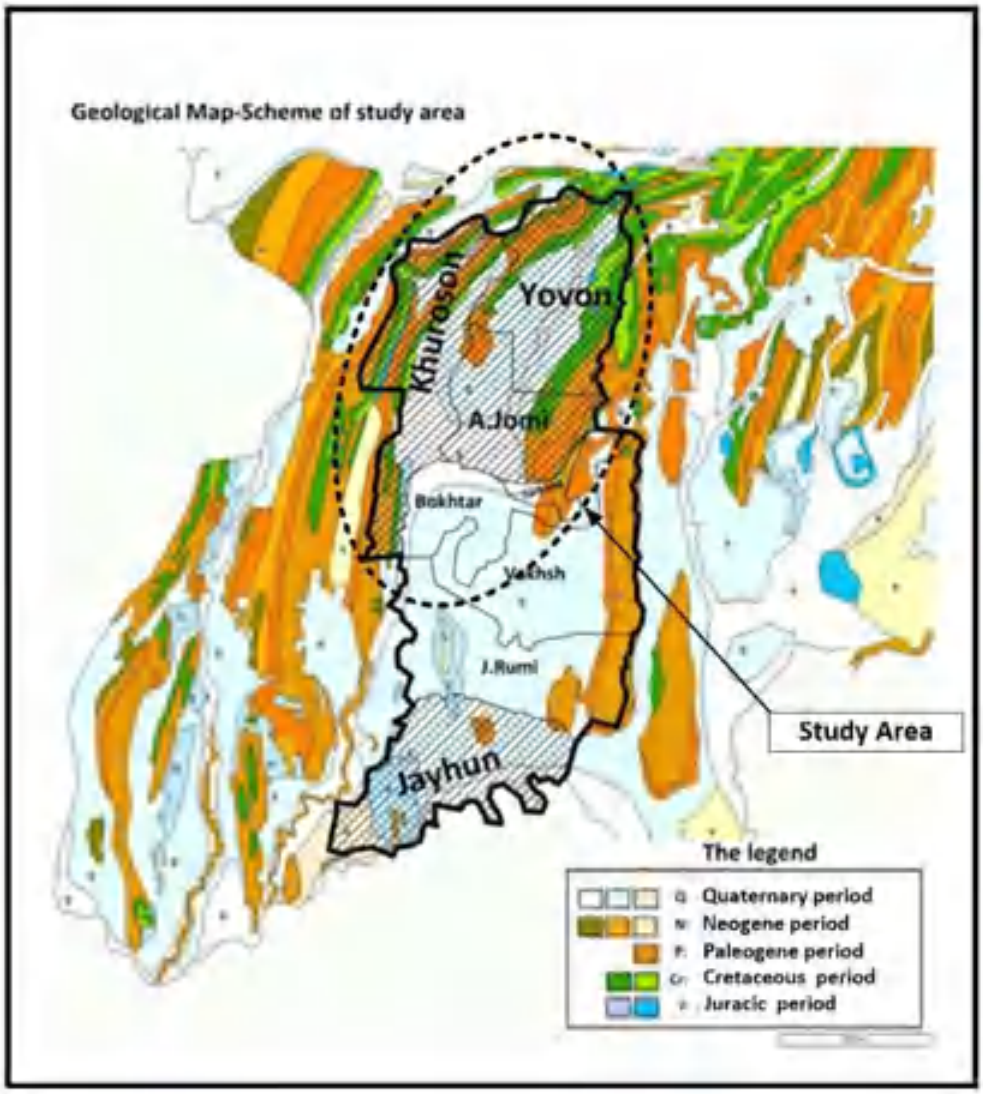
150. The Tajik depression is the northern part of the vast Afghan-Tajik depression, a negative restructure that developed since the Late Paleozoic, is an epigercyn alpine sub-platform, the eastern flank of the Turan plate, 7-15 km thick. In geomorphological terms, the territory is relatively low (600 - 2300 m), fan-shaped series of mountains, composed of Cretaceous, Neogene and Quaternary sediments. Many of them are heavily indented by rocky outcrops with widespread red sandstones and limestone and gypsum outcrops along ridges. The foothills consist of lowlands and oases. In areas where mountain ranges converge, a zone of continuous development of Meso-Cenozoic rocks, canyon-like riverbeds have formed. The catchment areas between them are typical hilly plains, into which riverbeds are cut to a depth of 400 - 500 m.

151. The Yovon Formation is represented by loess with well-defined horizons of fossil soils. The soils are brown, reddish-brown, and brown-brown loams with inclusions of calcareous nodules. In the section of their foot of the Karatau ridge, the measured thickness of the formation is 54.5 m. The Narynaui Formation is represented by a 20 m thick layer of homogeneous loess with four weakly expressed horizons of fossil soils.

152. In the Mesozoic and Cenozoic basins, there are oil and gas horizons, deposits of natural gas, fossil coal, mountain slopes, rock salt, and building materials.

153. The geological structure of the project zone includes Meso-Cenozoic sedimentary rocks with a thickness of about 400 m. The most ancient known in the area are represented by the Albian stage of the Lower Cretaceous system. The Upper Cretaceous System, Paleogene and Neogene in the section of the Yovon Valley and its mountain frame are typical of the South Tajik Depression and are fully represented (**Figure IV-4**).

Figure IV-4. Geology of the project area



5. Seismology

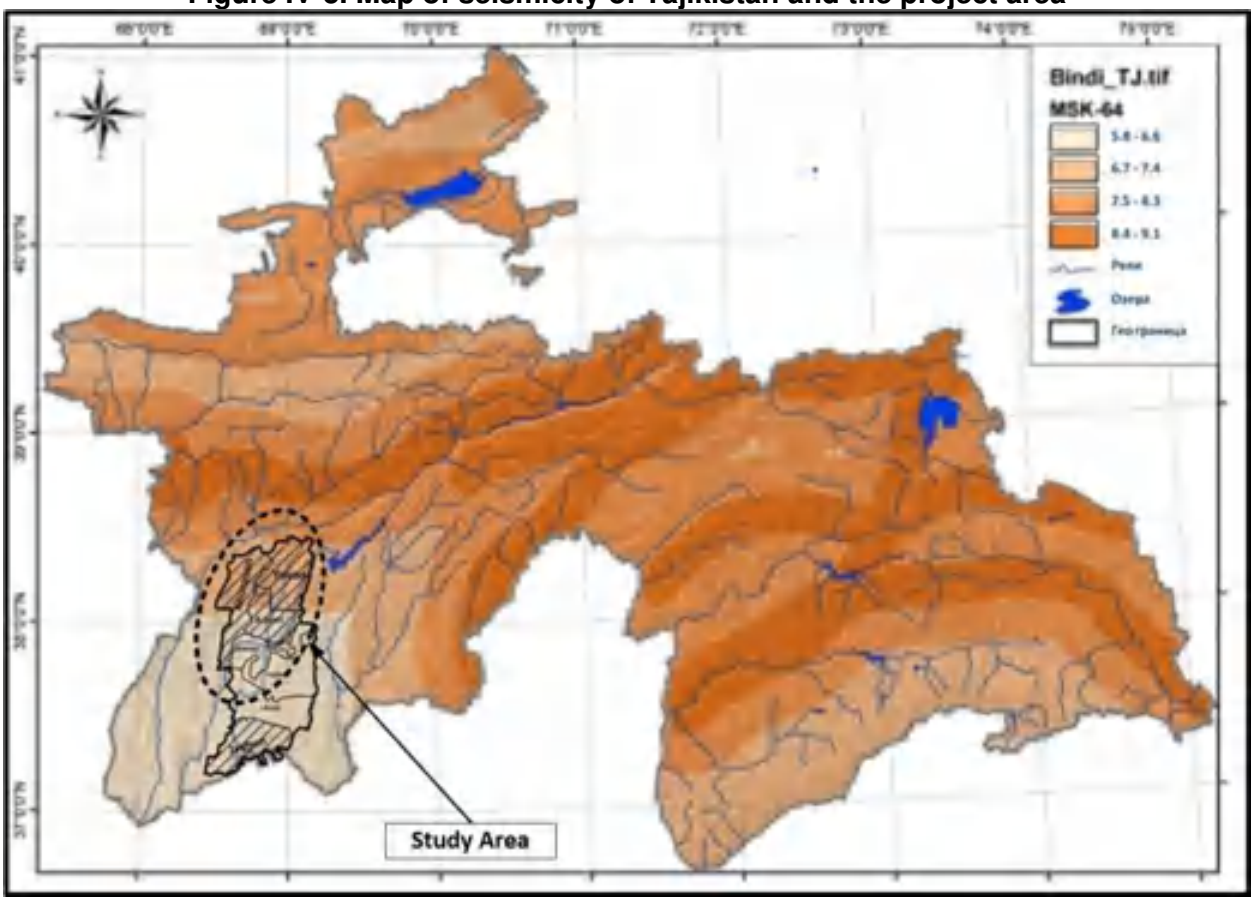
154. Since Tajikistan is located in an active seismic zone, earthquakes are very common. More than 1,000 earthquakes have been recorded in the territory but of low intensity (Richter 2 to 3). In the north and east of the Khatlon, there are fault lines; these for the limits of the Tajik depression. Incremental movements mean the region is experiencing a slow uplift. The project zone has potential for 7-8-point earthquakes (Richter scale) and further north and east up to Richter 9. Such earthquakes (>7.1) cause permanent deformations on the earth's surface, destructive effects, such as: landslides and mudslides and floods. Earthquakes cause additional stress on structures, and a serious seismic event can lead to the failure of critical structures, such as big siphons along the right branch of the Yovon.

155. The typical maximum magnitude of earthquakes in the region of the Project areas are as follows:

- Yovon 6.7-7.4
- Khuroson 5.8-7.4
- A. Jomi 5.8 -7.4

156. **Figure IV-5** shows the regions of seismicity.

Figure IV-5. Map of seismicity of Tajikistan and the project area



6. Natural disasters

157. Committee for Emergency Situations and Civil Defense of Tajikistan reported 114 emergencies and natural incidents in 2020. Mudflows, landslides and rockfalls tend to occur in spring and avalanches in the winter months. Damage due to mudflows in Khuroson district (on 4 April 2020) amounted to $127,500. Mudflows resulted in dozens of homesteads of local residents being flooded and damaged arable land. The Committee has so far cleared mud and water from 40 houses and household plots of as well as clearing 370 m of flume networks.

158. Landslides contribute to high sediment loads in the Vakhsh River, which create problems for water intakes and other infrastructure. Landslides increase with extreme precipitation and as vegetation cover decreases. Landslides affecting the main canals can also be very destructive causing overflow and erosion of the embankment.

7. Flooding

159. The Dartmouth Observatory Database do not show any flood events recorded in the command areas (Yovon and Kumsangir). A brief analysis of flood risk in this area was made by the project team using the GLOFRIS[19] model to estimate the effect of land cover and climate change on global flood risks in the river catchments. Results suggested that there may be some (river) flood risk associated with the main Vakhsh river valley. Part of the lower Vakhsh, north of the river in the area supplied by Shurabad canal system, will be inundated by flooding once every 100 years, but this may be moderated by dams

[19] GLOFRIS model description at https://models.pbl.nl/image/index.php/Flood_risks/Description

and the project area is located downstream from the great Nurek Dam and other dams are under construction. Another unlikely event would be a dam break in the upper reaches (at the Nurek, Golovnaya or Sangtuda). This is dangerous, but extremely unlikely.

8. Soil

160. The soils in the Vakhsh River Basin I&D system area are composed of windswept, pale yellow / light brown loess with a small proportion of clay, mostly silt and fine sand. They are uniform, loose, highly permeable, and deep, ranging from 150 m to 300 m. They are highly susceptible to erosion and deep ravines have formed in the command area.

161. Slopes are quite steep, but salinity of groundwater and highly permeable loess soils means that (subsurface) drainage systems are necessary, especially where slopes are flattened towards the bottom of the valley and to prevent crop losses due to high water levels and salinity in the root zone. Deep loess soils and saline groundwater have implications for I&D design requiring pipe transportation, canal lining, and outlet protection with gabions etc. Irrigated furrows require careful grading and flow control to minimize deep percolation losses and protect against soil erosion. Underground and open drainage systems need maintain low salinity and water levels below the root zone.

9. Surface water and quality

162. Precipitation brings on average 691 mm per year (less than 100 mm in the southeast to 2,400 mm on the Fedchenko glacier in the center of the country.

163. The source of irrigation for Khatlon region is mainly the Vakhsh, Kafarnigan, Kyzylsu and other shallow rivers. The Yovon and Kumsangir irrigation systems are located in the lower part of the Vakhsh river basin.

164. The Yovon and Khuroson valleys have their own sources of surface water - small, permanent rivers Yovonsu and Obikiik, which flow into the Vakhsh branch. These rivers are actively expressed during snow melting and precipitation, then their surface runoff almost disappears. For irrigation, local streams do not represent any serious significance. The Yovonsu and Obikiik rivers, and their Dammed tributaries are almost the only source of water for livestock grazing in the mountains in winter - spring.

165. The Vakhsh River 524 km long is one of the main waterways of Tajikistan, in terms of annual flow, it is second only to the two main Central Asian rivers Amu Darya and Syr Darya. The average annual water discharge in the river exceeds 600 m^3/s, and at its peak may exceed 1,400 m^3/s. The Vakhsh River carries much more water than is required currently for irrigation. It is fed by glacial snow melt. The increased water discharge in spring is associated with snow melting and heavy rains in the foothills and mountains. This coincides (May to September) with maximum water demand from the cotton crop.

166. About 220,000 ha of irrigated land has been developed in the Vakhsh River Basin, mainly in the lower part, and about 85% of the water withdrawn from the river is used for irrigation. There are limited agricultural areas in the upper part of the basin, there are no industrial plants and irrigation systems, which are small and include: (i) diversions of river flow along tributaries for gravity irrigation of river terraces, or (ii) lifting schemes for pumping water to terraces along the Vakhsh River. Many of these schemes suffer from high levels of sediment silting up the channels, as well as causing high wear on the pump impellers. To date, no major projects have been implemented in the upper part of the basin.

167. In the lower part of the Vakhsh River Basin, there are several major irrigation schemes including the Yovon system (220 m^3/s) which supplies a main channel (**Figure II-2**) that takes water from the Vakhsh river at 37°53'0" North latitude, 68°56'14" E, and distributes via gravity channels and cascade pumping stations that raise water from the channels. There are also several hydroelectric power stations. Water (70 m^3/s) is also supplied from the Baypazin reservoir via a 7.4 km long tunnel into the Yovon irrigation scheme (40,600ha).

168. Irrigation water is derived from two reservoirs built on the Vakhsh river. The water passes

through the Nurek reservoir, then the Baipazin reservoir (**Figure II-1**). Water is supplied to the right branch and the left branch of the main Yovon irrigation channels from the Baipaza reservoir through the Vakhsh Tunnel (**Figure II-2**). The water quality coming into the irrigation system is therefore dominated by the runoff from the catchment areas of the reservoirs. Under current conditions, the reservoirs are filled by runoff throughout the catchment areas. The quality of surface runoff water in the upper reaches of the Vakhsh River and its tributaries is determined by minerals entrained in the surface runoff and ice cover, wind transport of dust and atmospheric contaminants into water as well as from sediments formed during mudflows and any other polluting components that are entrained.

169. Typical processes of water mineralization occur as the water moves along rivers and channels and in the under-channel interstices of the river and the flow gradually becomes saturated with rocks particles, which slowly dissolve and increase the mineral composition of the purer natural water. Depending on the chemical composition, the waters of mountain rivers, lakes and ground waters are typically classified into types called hydrocarbonate (e.g. rivers Zeravshan, Kafirnigan Obikhingou, Varzob and Pamir) and sulfate (e.g. rivers Muksu, Surkhob and Vakhsh).

170. Water resources in the upper reaches of the Vakhsh River do not have anthropogenic sources of pollutants and the waters of the Vakhsh River is considered to be essentially unpolluted with a total mineralization of up to 0.4 g/l. In general, the quality of surface water in the Yovon irrigation system, which come from the Nurek and Baipaza reservoirs, is good being Class I (Good) and Class II (Satisfactory) according to the national hydrochemical index of water pollution (**Table IV-4**). The concentration of pollutants is not known to have reached high levels.

Table IV-4. Classification of Surface Waters

Class	Water quality	Salt content g/l						Recommended Usage
		Up to 0.2	0.2-0.4	0.4-0.6	0.6-0.8	0.8-1.0	1.0-1.2	
I	Good	<1.0	<0.8	<0.6	<0.4	<0.3	<0.2	Can be used for many years without special measures to prevent salt accumulation.
		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	
II	Satisfactory	1.0-2.5	0.8-2.0	0.6-1.5	0.4-1.0	0.3-1.0	0.2-0.6	Must be used in case of high drainage artificial or natural territory with annual preventive watering, preventing the gradual accumulation of salts.
		0.05-0.2	0.1-0.25	0.1-0.3	0.1-0.3	0.1-0.3	0.1-0.3	
III	Poorly satisfactory	2.5-6.0	2.0-5.0	1.5-4.0	1.0-3.5	1.0-3.0	0.6-2.5	Can be used in very high drainage areas with annual Leaching and mainly on light soils.
		0.2-0.5	0.25-0.8	0.3-0.9	0.3-1.0	0.3-1.1	0.3-1.1	
IV	Bad	>6.0	>5.0	>4.0	>3.5	>3.0	>2.5	Practically not suitable for irrigation, but in exceptional cases (on light soils with sufficient drainage), within limits not exceeding norms salt tolerance and with taking into account phases of plant development, can be used in the last watering.

Source: GOST 17.1.3.07-82 INTERSTATE STANDARD. Procedures for quality control of water in reservoirs and streams

171. The water returned from the irrigated areas of Tajikistan does not appear to have a significant impact on the quality of the river flow in general because the abstracted amount returned to the main river is low in comparison to the overall flow in the rivers and there is no information available on potential pollution by pesticides.

172. According to EHS Guidelines: Annual Crop Production (footnote 11), (i) water quality parameters such as Biochemical oxygen demand (BOD) (mg/L), pH, total suspended solids (TSS) (mg/L), turbidity (nephelometric turbidity unit), nutrients (mg/L), or other potential pollutants, should not deteriorate from baseline measurement levels, and (ii) Concentrations of pesticides, nitrates, coliform, or other potential agricultural contaminants should not exceed those described in national drinking water quality standards or internationally recognized guidelines (e.g., WHO Irrigation or Drinking Water Guidelines for

compounds potentially present in on-site groundwater wells or surface waters),[20] whichever are the more stringent. However, there is no recent information from measurements of water quality in the Vakhsh River system or the Nurek HPP reservoir, the Baipazinskaya HPP reservoir, or the exit from the Baypazin reservoir tunnel that enters the Yovon irrigation system. Therefore in order to establish baseline water quality, measurements will be made in the detailed design stage, to study water quality in the Vakhsh River as it enters the Yovon irrigation system at the exit from the Vakhsh Tunnel from the Baypazin reservoir and the discharge of drainage water into the Yavansu River and the Yavansu Estuary before inflowing back into the Vakhsh river. The analyses should include a suite of basic water quality parameters such as pH. dissolved oxygen, conductivity, total dissolved solids, total suspended solids, chemical oxygen demand and biological oxygen demand and turbidity that are available from the local laboratories.

10. Ground water

173. Groundwater on the territory of Tajikistan is distributed unevenly, both in area and depth. Underground water resources in the Khatlon region are estimated at 21.8% of the national value, and operational reserves are 25.9 %.[21]

174. Prior to the development of the irrigation scheme, the groundwater level was more than 20 m below ground level and the groundwater was salty. During irrigation, the groundwater level rose rapidly, by 0.5-3.0 m per year, with the flow of groundwater to the bottom of the valley. Seasonally, the groundwater table rises and falls due to seasonal (summer) deep percolation losses. Percolation and effective drainage ensure that the upper (2 m) soil horizons are not salinized.

175. Ground water in many areas of the region is mainly brackish (with high sulphate composition), and their mineralization increases as they descend into the estuaries of the valleys. Slightly salted ground water has some use in the economy: it is used for watering livestock. Deeper ground water is considered saline.

176. Poor drainage and sustained water logging of soil causes salt levels build up and stress to crops. Drainage can play a role in water conservation in a positive way, while inadequate drainage or lack of drainage can play a negative role in water conservation in a number of ways. Poorly drained soils typically exhibit a water movement pattern whereby water from precipitation and/or irrigation infiltrates a shallow depth of soil. Subsequently, the net movement of water is upward to the atmosphere through either plant water use or evaporation. In poorly drained soils or those with shallow water tables, the predominant process by which water leaves the soil is evaporation or evapotranspiration through the plants and back to the local hydrologic cycle. Another consequence of poor drainage and sustained water logging of soil is that plants grown on such soils often exhibit signs or symptoms of oxygen stress, which is often mistaken for drought. In such cases uninformed farmers are likely to attempt to resolve the apparent drought by additional irrigation; which leads to inefficient irrigation water use. Systems with controlled irrigation and ample drainage are necessary to reduce salinity below the root zone and prevent swamping. Based on observation and local level consultations, high ground water levels and salinity are reported by local authorities to be rising in parts of the Yovon area and waterlogging has occurred in areas where the ground is relatively flat.

11. Air quality

177. There is no recent information from measurements of air quality in or around the Project area. Based on observation, the air quality in the Project area appears to be generally acceptable due to the rural situation, low traffic numbers and lack of industrial sources of pollutants. The air quality in the Khatlon region is much better than other regions as there are few industrial pollutants and relatively low, although increasing, use of vehicles. Dust arises owing to the poor condition of the roads and

[20] WHO Guidelines for Drinking Water Quality http://www.who.int/water_sanitation_health/dwq/en/
[21] Web site ALRI https://alri.tj/en

accumulated dust on the verges arising when vehicles pass over unsealed shoulders of roads in many places. Dust concentrations will be higher, if only intermittently, along roads servicing the Project road when traffic passes. However, seasonal dust storms are a problem especially where vegetation has been cleared. Dust may be a temporary problem in summers during the proposed construction works.

12. Noise and Vibration

178. No noise measurements were available for the project area from secondary sources. Levels are expected to be typical for comparable Central Asian rural settings. The rural nature of the site means that average noise levels (by observation) will be low. Periodically noise may exceed the standards along main transport corridors and pumping stations.

179. Noise from vehicles is not a generally concern for the areas around most of the infrastructure as there are few sensitive receptors close to the sources and at present traffic is confined to occasional vehicles. Noise levels are generally within acceptable limits for the public and there were no complaints about current noise levels from the public during consultation.

180. EHS Guidelines (See footnote 10) apply an ambient criterion of Leq55 dB (A) for residential areas, hospitals and schools. Where the background exceeds the ambient standards, the criterion is background +3 dB(A).

181. Based on observation in the settlements and around IRDVRB, only intermittent road traffic runs throughout the day. EHS Guidelines of Leq55 dB(A) (day) and Leq 45dB(A) (night) for residential, school and hospital sensitive receptors is potentially exceeded at sometimes. As no background measurement have yet been made, it is recommended that in order to make a consistent assessment for all locations the existing criterion of background +3 dB(A) will be applied in the assessment for both daytime and nighttime.

182. Vibration is not a problem in proximity to the project. Residential areas close to the project are the homesteads serviced by the project.

13. Drought and water deficiency

183. Average temperatures have increased 1.5℃ in 40 years (1979 to 2019), while precipitation has shown a weak decreasing trend. Concerning Vakhsh river flows, a slight upward trend is evident of flows into Nurek reservoir between 1965 - 2009, most probably due to the net melting of upstream glaciers.

184. Water accounting, comparing supply and crop demand, over three years indicates that supply to the Right Branch command is not met in June, July and early August, while supplies to the Left Branch command are satisfactory. Rising temperatures may result in a modest to negligible increases in crop water requirements. Depending on the crop type and its growing period, crops may face reduced or increased temperature stress.

B. Biological resources

1. Habitat type

185. Based on the site visit conducted by TA consultants and considering the disturbance of the natural flora and fauna to install the irrigation system in the 1960s and 1970s and subsequent cycles of agriculture, there are not any critical or natural habitats in the areas to be impacted by the Project. Tajikistan has nine classes of natural ecosystems. The biodiversity includes about 23,000 species of flora and fauna, 1,900 of which are endemic. The 12 types of ecosystems that represented in Tajikistan are shown in **Figure IV-6**. Valuable plant communities are: forest, meadow, tugai, juniper, semi-mixed vegetation, which contains a significant number of rare, endemic and relict species.[22] In the study area, there are five main ecosystems: (i) agricultural systems (irrigated and rainfed arable land, gardens, woodlands and homesteads – most of the project area); (ii) mid-mountain xerophytic-sparse forest

[22] Fifth National Report on Biodiversity Conservation. 2014

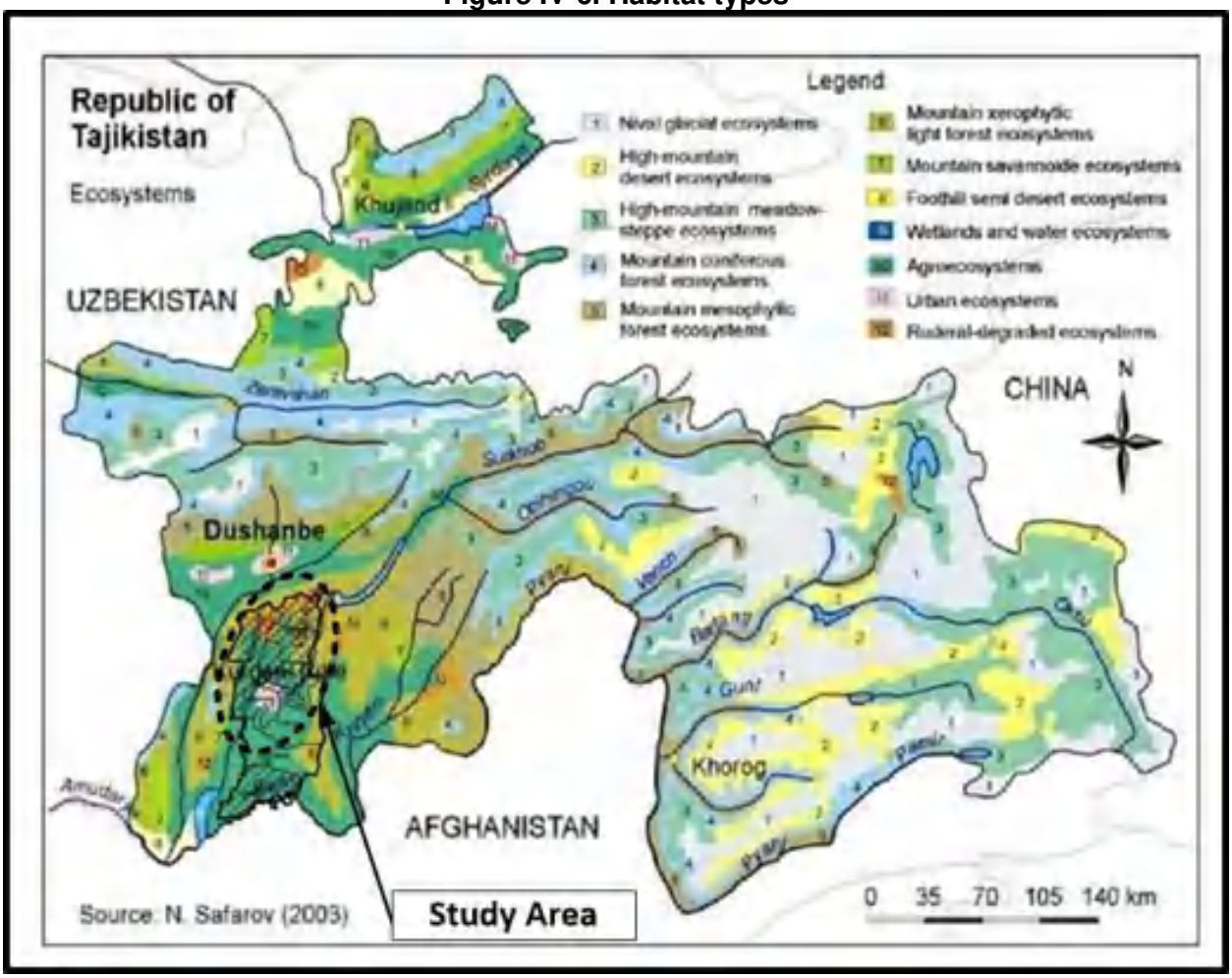
ecosystems; (iii) ruderal-degraded ecosystems; (iv) urbanized ecosystems; and (v) aquatic (including tugai meadow-marsh (in the lower reaches of rivers).[23]

2. Flora

186. The flora of Tajikistan has more than 9,771 species, and among them 2,000 species have economic and useful features, including human and animal foods. The protected species include about 30 species of plants (e.g. vavilov almonds, walnuts, pistachios, darvaz plum, cayon pear, suvorov onion, sumbul ferual, bulbous barley and rosenbach onion.

187. Natural vegetation in the Yovon and Khuroson valleys and environs differs significantly depending on if it is in the lowlands or within the mountain belt. The areas are naturally semi-desert. Most flat land has been subject to multiple cycles of plowing and planting and the natural vegetation cover is limited to a few areas peripheral to the agriculture and settlements.

Figure IV-6. Habitat types



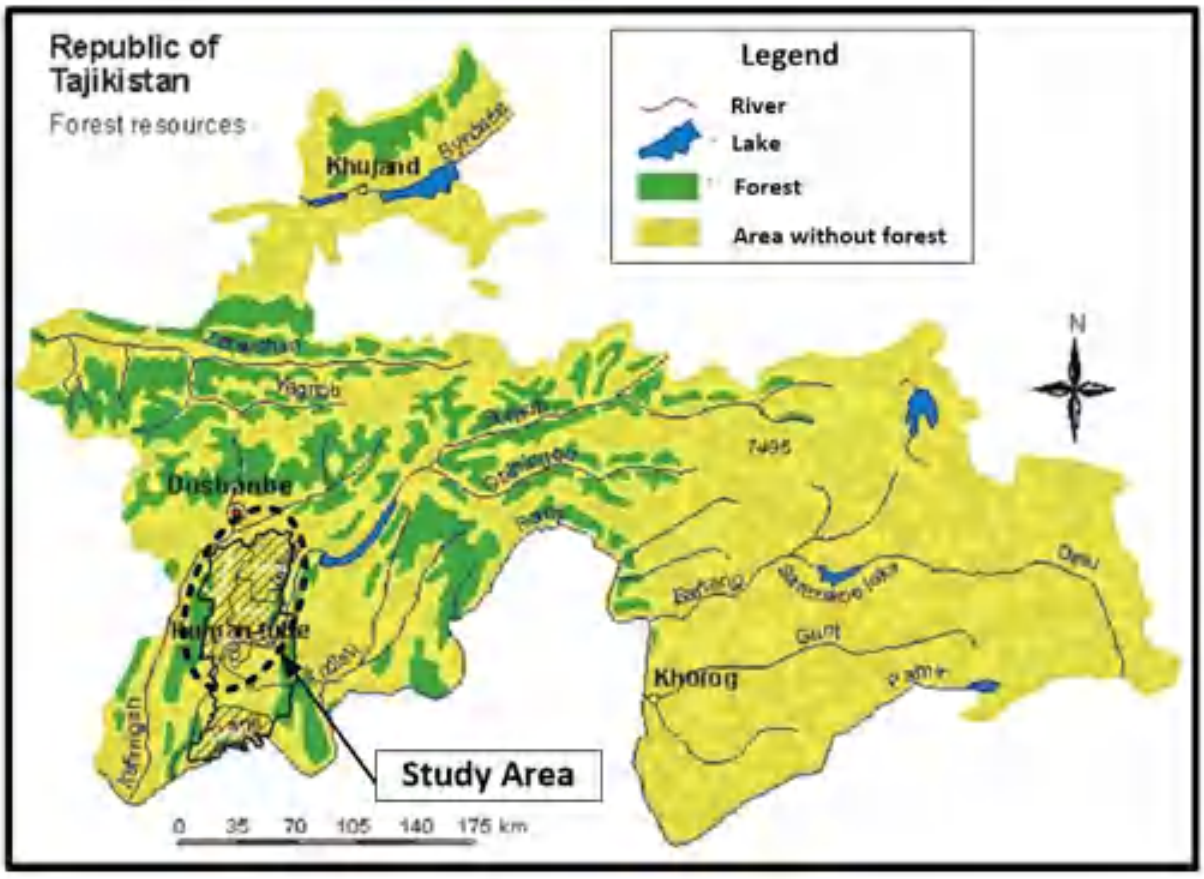
3. Forests

188. There are no forests on the study area (**Figure IV-7**). Fragments of forests remain on some foothills of the nearby mountain ranges. Valuable species such as pistachio (Pistacia vera), Bukhara almonds (Amigdalus bucharica) and other fruit trees are present and regional nature protection

[23] A form of riparian forest or woodland associated with river and floodplains prone to periodic flooding and highly dependent on floods and groundwater rather than precipitation.

departments have been trying to increase the area under pistachio in recent years, because this crop is valuable not only as a fruit, but also as an anti-erosion measure (with roots spreading tens of meters). The local forests have deteriorated significantly in recent decades.

Figure IV-7. Forests of Tajikistan

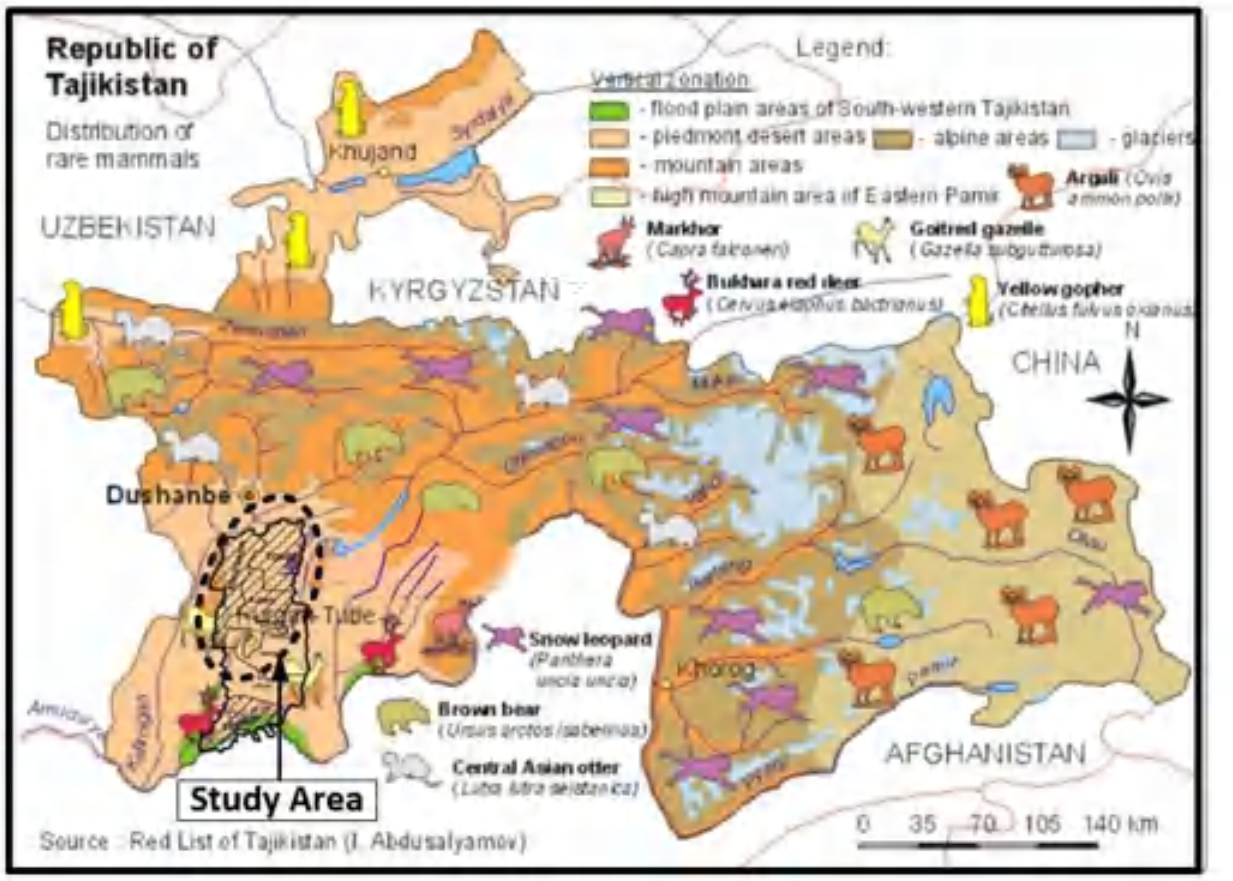


4. Fauna

189. The territory of Tajikistan is home to 84 species of mammals, 385 species of birds, 46 reptile species, 52 fish species, 2 amphibian species and more than 10 thousand species of invertebrates. The biodiversity is largely due to the geographical position of Tajikistan in Eurasia and the variety of habitats and biomes (**Figure IV-8**). The study area is naturally piedmont desert area and outside the study area, the remaining natural low mountain forest ecosystems supports some populations of gazelle (Gazella subgutturosa), urial (Ovis vignei bocharіensis), wolf (Canis lupus), fox (Vulpes vulpes), reptiles - Central Asian cobra (Naja oxiana), steppe turtle (Testudo horsfieldi) and others. Lower down the valleys in the tugai there are jungle cat (Felis canans), jackal (Canis aureus), Bukhara deer (Cervus elaphus bactrianus) and others.[24]

[24] Fifth National Report on Biodiversity Conservation, 2014

Figure IV-8. Biomes and rare mammals in Tajikistan



5. Avifauna

190. The study area is agricultural areas and home to a large number of birds, including the hoopoe (Upupa epops), rollers (Coraciidae), golden bee-eater (Meropidae), pigeons (Columbidae), quail, corncrake (Crex crex), lapwing (Charadriidae) shrike (Lanius collurio), orioles (Oriolus oriolus), larks (Alaudidae), and usually large flocks of main starlings (Acridotheres tristis). In the highlands there are pikas (Tichodroma muraria), eagle owls (Bubo bubo), griffon vulture (Gyps fulvus), redstart (Phoenicurus) and stone thrush (Monticola).

191. In the composition of aquatic and semi-aquatic (tugai ecosystems) from pebble coastal spits to dense tugai vegetation. The most typical bird species of this ecosystem are the egretta alba, Ardea cinerea), bittern (Botaurus stellaris), teal cracker (Anas querguedula), teal whistle (A. crecea), reed harrier (Circus aeruginosus), shepherd (Rallus aquaticus), moorhen (Gallinula chloropus) pheasant (Phasianus colchicus), small cormorant (Pholacrocarax pugmeus), great cormorant (Ph. carbo), snake eagle (Circaetus ferox) and others.

192. Breeding inhabitants of reed thickets and shrubs are: osprey, harrier, short-footed snake-eater, shilokak, striped stilt, heron, egret, bittern, ibis, spoonbill, cormorant, griffon, pheasant, nightingale, and various species of warblers. Constantly migrating species in winter are: red duck, witch, mallard, pintail, red-nosed duck and the endangered marble teal. Constantly migrating species in the spring and autumn periods are the glee grass, black eared kite, white-tailed eagle, saker falcon, black stork, white stork, black-breasted ruddy neck, bluethroat, crane, demoiselle crane and a very large variety and number of waders.

6. Fish

193. In connection with the development of new lands and the construction of hydroelectric power plants, a change was made in the species composition of aquatic animals. The drying up of the Aral Sea has eradicated the migration route of fish. Other species of commercial fish are under threat of extinction.

194. The fish fauna of the lower reaches of the Vakhsh River, including the lakes of the Tigrovaya Balka Reserve, is represented by 27 species of fish, including the large Amu Darya shovelnose (Pseudoscaphirhynchus kaufmanni), the small Amu Darya shovelnose (Pseudoscaphirhynchus hermanni), grass carp (Ctenopharyngodon idella) rattle (Capoetobrama kuschakewitschi), samarkand temple (Capoeta heratensis steindachneri), and common carp (Cyprinus carpio).[25]

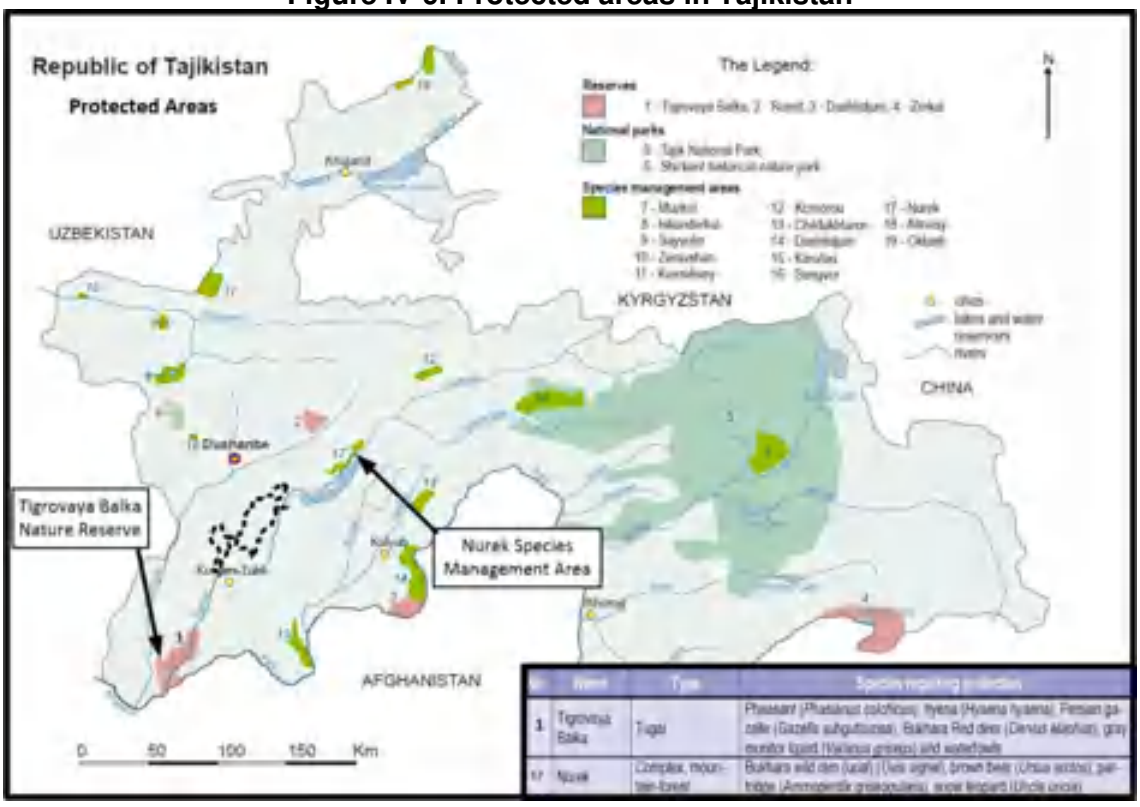
195. In A. Jomi district, the Vakhsh river provides great opportunities for the development of fish farming and irrigation of fallow lands. The distance between A. Jomi district to the regional center of Bokhtar is 35 km, and to Dushanbe 87 km connected by inter district highways. One specialized fish farm “Mohii Khushzot” and 17 small fish farms operate in the region. The total area of land covered by fish farming is 789 ha.[26]

196. The district center is the urban-type settlement at Dusti which is 60km from Bokhtar.

7. Protected areas

197. The system of protected areas in Tajikistan includes four categories of IUCN protected areas: one Nature Reserve, two National Parks, 26 natural monuments (IUCN category III) and 14 species management areas (IUCN category IV).[27]

Figure IV-9. Protected areas in Tajikistan



[25] UDK 597 (575.3), Synopsis https://www.tnu.tj/avtorefi/avtorefMirzoevNM.pda
[26] https://medt.tj/documents/programma-razvitiya-regionov-i-oblastey/ru/djomi.pda
[27] Protected Area Categories | IUCN

198. Particularly valuable representative biodiversity communities that need protection are: juniper, birch, walnut forests, thickets of ash trees, aflatunniks, sophora, mountain steppes, meadows, tugai, saxaul forests, pistachios. They are in danger of not only reducing areas, but also destruction of the structure of communities and loss of valuable species of plants and animals from their composition.[28]

199. All work within the Yovon and Khuroson irrigation project areas will be carried out in disturbed areas highly modified agricultural landscape within the existing well-organized irrigation system. There are no known rare or endangered species of flora or fauna, or protected areas that may be affected by the Project. There are no protected areas on or in the immediate vicinity of the command area. The nearest is the Tigrovaya Balka nature reserve about 40km to the south in the Jaikhun region at the mouth of the Vakhsh river. Nurek Species Management Area is to the north east of the study area about 30 km away where protection is given in accordance with IUCN Cat IV where valuable ecosystems grow on the river sediments (**Figure IV-9**).

200. More than 100km to the southeast of the Project area, there is a Dashtijum State Nature Reserve, established in 1983 in the wooded mountains bordering the Pyanj River. In the immediate vicinity there is the Dashtijum Reserve and Species Management Area, established in 1972. These reserves were created to protect the markhor habitat, as well as pistachio, almond and cherry forests, where a wide variety of irises, anemones, wild onions and foxtail grow.

201. The Tigrovaya Balka Nature Reserve is a 40 km long alluvial plain, where valuable ecosystems grow on the river sediments of the Vakhsh River. The Vakhsh River itself is meandering in this area. The conservation programs are being implemented in Tigrovaya Balka in order to preserve inland water bodies and oxbow lakes. Tigrovaya Balka was influenced by agricultural developments and wastewater discharge. It is also likely that the reduction in sediment transport in the Vakhsh River after the construction of the Nurek hydro power plant led to a decrease in the riverbed, and this, in turn, caused a decrease in the level of groundwater within the reserve.[29]

202. The Tigrovaya Balka Nature Reserve was created in 1938 to protect the remains of the Turanian tigers (Panthera tigris virgata), whose family became completely extinct in the 1950s. The area of 49,786,000 ha has many number of 28 protected species of animals, 214 protected bird species and 480 protected plant species.[30] It is also designed to support populations of the snow leopard (Panthera uncia) and brown bear (Ursus arctos) and is of particular importance for what is considered the best-preserved tugai ecosystems in Tajikistan. However, this reserve suffers from poaching, fires, agricultural expansion, and water pollution.

C. Socio-economic and Cultural Resources

1. Administrative Divisions

203. The Provinces and administrative divisions of Tajikistan are presented in **Figure 0-1**. The study area is in Yovon, A. Jomi and Khuroson districts in Khatlon Province about 35 km south of the Capital Region of Dushanbe. Each province/region is divided into several districts (Rayon), which in turn are subdivided into self-governing village level units (Jamoats) and then villages (Qyshloqs). There are 2 villages and 7 jamoats in the Yovon district, 1 village and 5 jamoats in the Khuroson district, and 1 village and 7 jamoats in the A. Jomi district.

2. Population and Demographics

204. The areas and populations across the country are compared in Table IV-5. Taking into account

[28] Website of the National Center for Biodiversity and Biosafety of the CEP under the Government of the Republic of Tajikistan http://www.biodiv.tj/page?cat=22

[29] Rogun HPP Environmental and Social Impact Assessment for Rogun Hydro Power Plant

[30] Environmental protection in the Republic of Tajikistan (statistical collection). © Agency for statistics under the President of the Republic of Tajikistan, 2019

the registration of births, deaths and migration, the population in 2020 was 9.31 million. The population of the Khatlon region as of 1 January 2020 was 3.35 million people with a relatively high population density.[31]

205. The birth rate is higher than the world average, and the death rate is lower. The population growth rate is about 2.3 % and has slowed down. The country's population is relatively young: more than a third of the population is under 15 and two-thirds are under 30. Average life duration is 72 years for women and 65 years for men.[32] About three quarters of the population are rural residents.[33]

Table IV-5. Population of Tajikistan, territory by regions

Province/Region	Area (thousand km²)	Population as of 1 Jan 2020 (thousand people)
Dushanbe	0.126	863
Sughd Province	25,400	2,705
Khatlon Viloyat	**24,800**	**3,350**
Region of Republican Subordination	28,600	2,169
Gorno-Badakhshan Autonomous Region	64,200	229
Total Tajikistan	143,010	9,317

Source: Statistical Agency under the President of Tajikistan, 1 January *2020.*
The Project site is in Khatlon province.

206. The areas and populations across the three study area districts are compared in **Table IV-6**.

Table IV-6. Population of the Project Area by District in 2019

District	Area (km²)	Population of 2019 (in thousands)	Urban population %	Rural population %
Yovon	976.2	229.5	17.6	82.4
Khuroson	896.1	116.54	10.0	90.0
A. Jomi	600	171.5	7.8	92.2

Source: Statistical Agency under the President of Tajikistan, 1 January *2020.*

207. Tajiks who speak the Tajik language are the main ethnic group within the country, though there are sizeable minorities of Russians and Uzbeks. Before 1990, Tajikistan was a tri-national republic (Tajik-Uzbek-Russian), then after 1990, it became actually a bi-national (Tajik-Uzbek). The share of Uzbeks in the population decreased from 23 % to 13.94 %; the share of the Kyrgyz remained the same - just over 1 %. At the same time, in the intercensal period, the number and proportion of Tajiks increased significantly: there were 3,172.4 thousand (62.3%) in 1989, and 4,898.4 thousand (84.26%) in 2020.[34] In Khatlon Oblast and in the Project area, Tajiks make up 87 to 90% of the population.

3. Livelihoods

208. Tajikistan is the poorest of the former Soviet countries and vulnerable to economic shocks caused by fluctuating regional needs. The country has a gross domestic product (GDP) per capita of $822 and a narrow economic base dependent on limited commodities (cotton and aluminum) and remittances. Officially, there are about 500,000 labor migrants from the country, mostly in Russia, although the actual figure could be as high as 2 million.[35] About 95% of Tajik labor migrants are men from rural areas.[36] Accordingly, in 2018, remittances and agriculture accounted for 20% of GDP.[37] The electrical power and agricultural industries dominate Khatlon regions 537 enterprises that are responsible for 3.4 % of industrial production in Tajikistan in 2016.

[31] © Agency on Statistics under the President of the Republic of Tajikistan, 2020.
[32] British encyclopedia. www.britannica.com/place/Tajikistan/People#ref342338. Date of treatment: 29 March 2020.
[33] Agency on Statistics under the President of the Republic of Tajikistan (Tajstat). 2019. Tajikistan in Figures. Dushanbe.
[34] http://www.cisstat.com
[35] The Economist, 7- March 2020.
[36] Mukhamedova and K. Vegerich N. 2017. The feminization of agriculture in post-Soviet Tajikistan.
[37] The World Bank. Received personal remittances (% of GDP) (circulation date July 30, 2019).

209. Tajikistan relies on agriculture. 70% of the population lives in rural area. The agricultural sector employs the largest share of the work force both nationally (61%) and in Khatlon region (44%). The most important source of household cash income in 2019 was from direct labor. Agricultural production reached 85.0 thousand tons of cotton fiber, 870.4 thousand tons of grain crops, 245.4 thousand tons of potatoes, 198.0 thousand tons of cotton - raw materials, 954.3 thousand tons of vegetables, 463.2 thousand tons of food melons. The number of cattle in the region at the end of 2016 in all categories of farms amounted to 994.8 thousand heads, including 480.8 thousand cows, 2,211.2 thousand sheep and goats, 56.9 thousand horses. Capital investments in the development of the economy of the Khatlon region in 2016 amounted to 2,375,812.5 thousand somoni, or 21.3% of the total volume for Tajikistan.[38] The Yovon Combined Heat and Power Plant, Yovon Electrochemical Plant and Yovon Cement Plant and pumping stations are also significant employers.

Table IV-7. Cropping patterns in the study area

	Cropping area for all categories of farms in 2016[39] (ha)				
	Tajikistan	**Khatlon**	**Yovon**	**Khuroson**	**A. Jomi**
Total land under cropping	837,299	412,417	31,608	15,808	19,177
Cereals	423,469	201,095	11,320	8,774	6,307
Cotton	162,558	115,535	11,405	4,110	7,800
Potato	41,577	11,212	542	327	742
Vegetables	58,205	29,870	2,864	859	1,098
Cucurbits	19,970	13,210	1,204	335	201
Fodder crops	103,265	31,354	3,232	555	2,722

Source: Agency on Statistics under the President of the Republic of Tajikistan, 2020

Table IV-8. Tajikistan's Socio-economic indicators[40]

INDICATOR	**2017**	**2018**	**2019**
Population, at the end of the period (million)	8.9	9.1	9.3
Nominal GDP (million somoni)	64,434.3	71,059.2	77,354.7
Including, %			
Agriculture	20.3	19.8	19.8
Industry	19.9	21.2	17.4
Services and trade	50.0	493	52.4
GDP per capita (somoni)	7,241.4	7,870.2	8,388.3
GDP growth, as a percentage of the corresponding period of the previous year	-	7.6	7.5
State budget deficit-surplus (% of GDP)	3.6	0.4	-0.6
Consumer price index, % of the corresponding period of the previous year	107.3	103.8	107.9
Food price index	109.1	102.5	111.0
Service price index	106.0	105.9	102.6
Somoni to dollar rate	8.5497	9.1512	9.5101
Officially registered unemployment rate, %	2.1	2.0	2.1
Number of registered unemployed thousand People	49.7	47.5	49.0
as a percentage of the corresponding period of the previous year	93.7	95.6	103.1
Average monthly salary (somoni)	1,147.79	1,237.47	1,335.52
as a percentage of the corresponding period of the previous year	119.5	107.8	107.9
Trade Balance ($ million)	-1,576.8	-2,076.2	-2,174.9
Share of food in imports, %	23.0	19.6	20.6
Share of food in exports, %	2.6	2.3	2.7

Source: Agency on Statistics under the President of the Republic of Tajikistan, 2020.
GDP = gross domestic product

4. Poverty

210. Tajikistan has a fast-growing population of 9.5 million in 2020, of which 47 % live on less than $1.33/day. In the years 2000 and 2017, the poverty rate fell sharply from 83 % to 30 % while the economy grew at an average of 7 % per year. However, job creation has not kept pace with population growth.

[38] Regions of the Republic of Tajikistan. Agency on Statistics under the President of the Republic of Tajikistan 2017.
[39] Regions of the Republic of Tajikistan. Agency on Statistics: President of the Republic of Tajikistan 2017.
[40] Agency for Statistics under the President of the Republic of Tajikistan, 2020. Food security and poverty.

Rural poverty rates remain high, for example, only 47 % of the rural population has access to safe drinking water. Tajikistan scores 0.53 on the Human Capital Index, below its regional average but above its income group average.[41]

Table IV-9. Poverty and extreme poverty rates 2018

№	Region	Poverty rate, %
1.	Tajikistan	11.8
2.	Dushanbe	11.1
3.	Sughd region	6.1
4.	Khatlon region	12.6
5.	Gorno-Badakhshan Autonomous Region	11.9
6.	Region of Republican Subordination	17.5
7.	Cities / city lines	9.1
8.	Villages / countryside	11.8

Source: Statistical Agency under the President of Tajikistan, 2019 (Household budget survey).

5. Health

211. There are 37 hospitals in the Khatlon region. The capacity of outpatient clinics is 33.0 (visits per shift) per 10 thousand population. The population of Khatlon is provided with medical services by 482 doctors of all specialties and 1,918 by paramedical personnel.[42]

212. Health indicators in Tajikistan such as infant and maternal mortality rates are among the highest of the former Soviet republics. Since recent years the post-Soviet era, life expectancy has decreased as a result of poor nutrition, polluted water supplies, and increased incidence of cholera, malaria, tuberculosis, and typhoid. The leading causes of death are cardiovascular diseases, respiratory disorders, and infectious and parasitic diseases. Although there are a number of hospitals and health centers in the project area, the health care system has deteriorated badly and receives insufficient funding, and sanitation and water supply systems are in declining condition. This has resulted in a higher risk of epidemic disease.

Table IV-10. The incidence of infectious diseases, cases[43]

Infectious diseases registered	2018				2019			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Total	9,274	16,783	25,865	14,015	8,147	15,183	28,882	14,020
Acute intestinal infections	3,384	11,527	21,809	5,486	2,175	10,050	24,005	6,316
Bacterial dysentery	44	68	217	75	25	56	195	69
Typhoid fever	2	2	15	2	-	-	7	4
Acute viral hepatitis	1,435	560	1,315	4,010	1,666	714	1,704	3,850
Tuberculosis	1,022	1,311	1,064	1,115	1,017	1,245	1,181	1,042
Brucellosis	163	265	222	115	106	278	264	128
Parasitic diseases	9,574	16,483	14,056	13,629	13,220	13,994	16,651	1,219

Source: Statistical Agency under the President of Tajikistan, 2019.

6. Human issues and quality of life

213. Yovon is 30 km south of Dushanbe with access by road and rail (Bokhtar - Yovon - Vakhdat line). It has 313 clubs, 3 theaters and 21 museums provide cultural and educational services to the population. The housing stock has a gross area of 32,748 m^2 equivalent to 10.5 m^2 per inhabitant.[44]

214. Since 2020, modern warehouse and refrigeration facilities with wholesale and retail shopping center is being built in the Khuroson district with jobs for about 1,000 people with the commissioning of

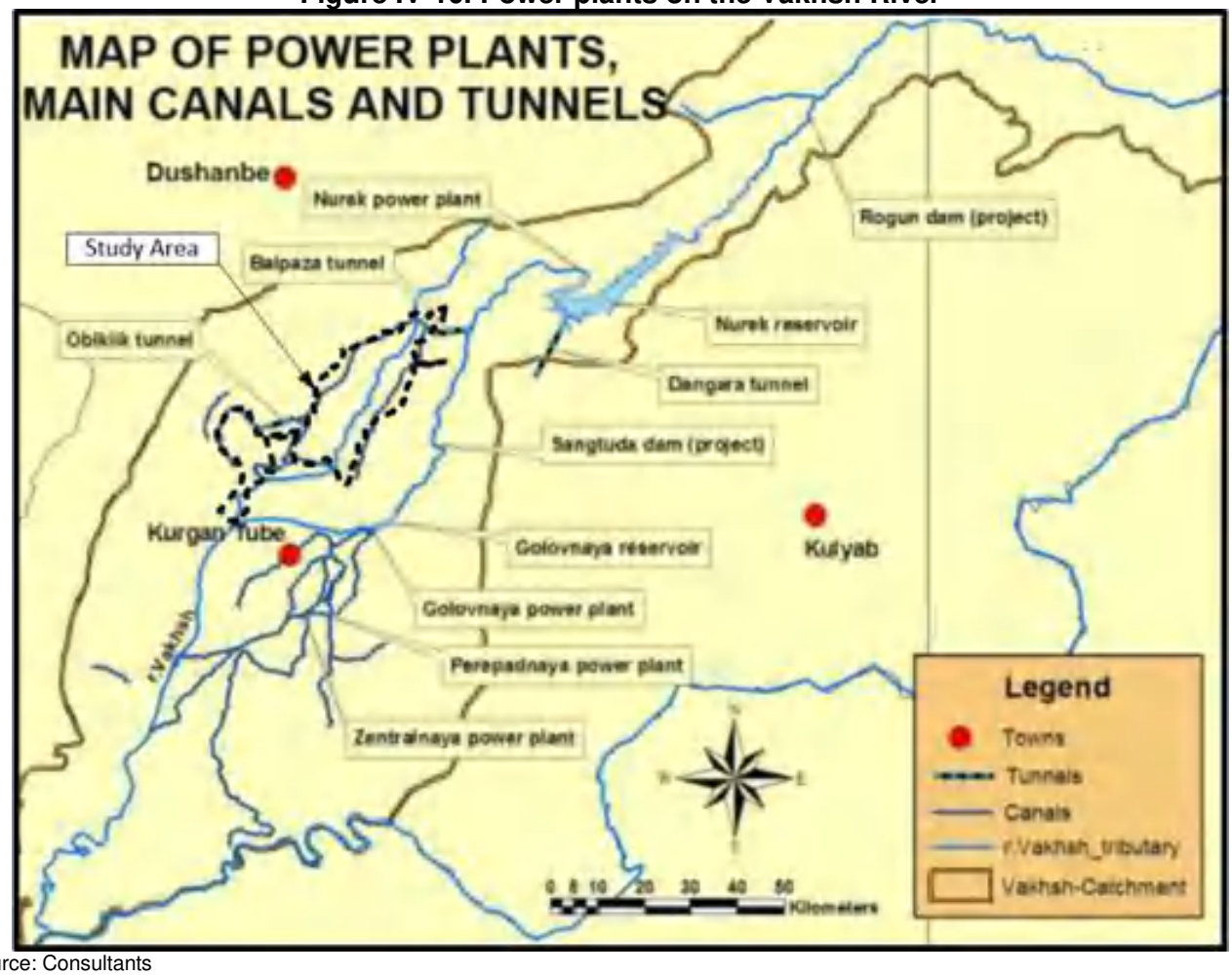
[41] The World Bank. https://www.worldbank.org/en/country/tajikistan/overview. Date of treatment: 30 March 2020.
[42] Regions of the Republic of Tajikistan. Agency on Statistics under the President of the Republic of Tajikistan 2017.
[43] Agency on Statistics under the President of the Republic of Tajikistan, 2020. Food Security and Poverty / Агентство по статистике при Президенте Республики Таджикистан, 2020. Продовольственная безопасность и бедность
[44] Regions of the Republic of Tajikistan. Agency on Statistics under the President of the Republic of Tajikistan 2017.

the complex.[45] In Khuroson, there is a park of culture, a national park, 5 restaurants, 4 hotels, 3 museums, a teahouse. In addition, there are 6 ancient shrines, including Taba-tobein, Gulchechak, Zokirjon, Surkh, 7 memorials, as well as 6 souvenir shops.[46]

7. Electrical Power

215. The electrical power plants in Tajikistan produced 15,763 million kW hours of electricity, 45.9 thousand kVA power transformers in 2016. Hydropower plant (HPP) provided 91 % of the country's electricity as of 2005. The Head HPP and Nurek HPP (2.7 million kW) were built on the river. Sangtuda HPP-1 was commissioned in 2009, and Sangtuda HPP-2 (220 MW) was commissioned in 2014. The Rogun HPP, which is large in capacity, is being built (**Figure IV-10**).

Figure IV-10. Power plants on the Vakhsh River



Source: Consultants

8. Education facilities

216. There are 132 preschool institutions in Khatlon region (15,100 children) 1,328 daytime schools (680,800 students), 16 secondary vocational education institutions (21,500 students) and 6 for higher professional education (29,500 students).

217. School attendance is mandatory between ages 7 to 17, however, many children fail to attend

[45] https://east-fruit.com/article/v-rayone-khuroson-vozvoditsya-samyy-krupnyy-na-yuge-tadzhikistana-optovo-roznichnyy-i-logisticheskiy-tsentr

[46] https://traveltajikistan.tj/ru/

because of economic needs and, in some regions, security concerns. Tajikistan‘s education system suffers from a depleted infrastructure and an acute shortage of teachers at all levels. This will become more acute because of the relatively high birth-rate. The official literacy rate is 98 %, but the poor quality of education since 1991 has reduced skills in the younger generations. In the Khatlon region, 502 public libraries have 2.5 million books and magazines.

Table IV-11. Education and health statistics 2016/2017

Description	Tajikistan	Khatlon	Yovon	Khuroson	A.Jomi
Anytime general education institutions Number of students (thousand people)	1,837.8	680.8	48.6	24.6	35.8
Number of teachers in Anytime general education institutions in 2016/2017 (thousand people)	116.9	40.8	2.3	1.6	1.7
Number of doctors of all specialties in 2016 (people)	18,044	3,528	185	103	123
Number of nursing staff in 2016 (people)	49,434	16,053	779	413	582
Hospital facilities. Number of institutions / number of beds in 2016	479 / 39,816	149 / 11,129	4 / 740	7 / 251	5 / 321
Commissioning of secondary schools, student places in 2016	12,258	9,414	640	400	228
Commissioning of hospitals (beds) in 2016	745	50	-	-	-
Commissioning of polyclinics (visits per shift) in 2016	3,121	501	-	52	25

Source: Agency on Statistics under the President of the Republic of Tajikistan, 2020.

9. Gender composition

218. Like other former Soviet republics, Tajikistan, when it announced its independence, inherited an ideology that supported equal rights for women and men. At the beginning of the transition period, traditional patriarchal models of family and social life were revived as the country moved away from its Soviet past. This was compounded by the devastating civil war, which left an estimated 25,000 widows, 55,000 orphans and nearly one million displaced persons behind. In the immediate aftermath of the civil war, girls were married off without being able to complete their education, leading to a generation of women with lower levels of education than their mothers and who repeat the same cycle with their own children. These conditions contributed to the revival of conservative values that could be observed in post-Soviet and post-war Tajikistan and as shown by the increase in early marriage, polygamy, and the limited social life of women.[47]

219. Since 2009, the poverty level in Tajikistan has been declining, but remains high. There is no difference in poverty between men and women, but female-headed households are more at risk of poverty and extreme poverty than male-headed households. National surveys show that female-headed households are less likely to own valuable commodities such as cars, trucks, computers, land and livestock. Given that the number of female-headed households is growing, women's limited access to and control over assets has serious implications for a large portion of the population.

220. The female labor force participation rate is 45 % and varies from region to region. Women are disproportionately represented in health care (58.7 %) and education (53.7 %), where average incomes are lower than in other sectors. Agriculture employs 48 % of all working women, but this figure could be higher when considering unpaid work of women who work with their husbands. Women are also employed in low-skilled jobs and similar occupations, as well as in informal employment, which directly leads to income inequality. In 2013, the average monthly wage for women was only 63.3 % of that for men, but this figure has improved over the past decade. However, it is not clear whether the narrowing wage gap is related to an increase in women's wages or a decline in men's wages. Only partly can the gender wage gap be explained by variables such as differing employment patterns for men and women.

[47] Tajikistan: Country Gender Assessment | Asian Development Bank (adb.org)

Gender discrimination and stereotyping also play a role in lower wages for women as they are presumed to have recourse to other sources of support (See footnote 47). **Table IV-12** shows the population by gender composition of the Khatlon region.

Table IV-12. Resident population in Khatlon region as of 1 January 2020

Indicators (thousands)	Men	Women	Both sexes
Khatlon region			
Total population:	1,685.3	1,663.0	3,348.3
Including age below the working age	142.8	592.1	1,234.9
Working age	980.4	957.1	1,937.5
Over working age	62.1	113.8	175.9
Urban population			
Total population:	300.2	299.3	599.5
Including age below the working age	110.0	101.4	211.4
Working age	179.9	176.5	356.4
Over working age	10.3	21.4	31.7
Rural population			
Total population:	1,385.1	1,363.7	2,748.8
Including age below the working age	532.8	490.7	1,023.5
Working age	800.5	780.6	1,581.1
Over working age	51.8	92.4	144.2

Source: Agency on Statistics under the President of the Republic of Tajikistan, 2020.

10. Physical Cultural Resources

221. Tajikistan has been home to many historical and pre-historic cultures and consequently physical cultural resources of significance are common in Tajikistan and also known from some locations in the Yovon area. Ancient canals of the Kushan period have been found in the Vakhsh valley. An ancient settlement near present day Uyaly, was located on the upper terrace. Numerous sites of the Hissar culture were opened in 1969 in the Yovon and Dangara valleys. Other monuments of the Kushan period and the Yovon settlement of Garavkala, north of the Vakhsh valley also date from the Kushan era.

222. However, at this stage, there are no known physical cultural resources within the construction areas nevertheless because the general area south west of Tajikistan is known to have many sites of cultural interest. Any site clearance, digging and excavation activities undertaken during pre-construction or operations might un-earth physical cultural resources including archaeological and grave sites. Contractors will be required to keep a watching brief for physical cultural resources and precautionary mitigation measures will be included in the EMP.

V. Anticipated Environmental Impacts and Mitigation Measures

223. This assessment is based on the Phase 1, 40,355 ha plan identified by the engineering and planning workstreams in May 2021. Determining the scale of impact depends on (i) spatial scale of the impact (site, local, regional, or national / international); (ii) time horizon of the impact (short, medium, or long term); (iii) magnitude of the change in the environmental component brought about by the project activities (small, moderate, large); (iv) importance to local human populations; (v) compliance with international, national, provincial, or Hukumat level environmental protection laws, standards, and regulations; and (vi) compliance with guidelines, policies, and ADB SPS. To avoid repetition, the detailed mitigation measures and monitoring for all activities in the EMP are conveniently linked and listed in the EMMP (**Table VII-4**). The EMMP can be used at the bidding stage in the specification to inform the contractors of the required measure and actions to satisfy the requirements of the IEE and EMP and to guide the preparation of SSEMP in due course.

A. Impacts of Design and Pre-Construction

224. Pre-construction impacts are mainly associated with the preparatory works to facilitate upgrading and reconstruction. In preconstruction, these will be limited to climate change adaptation

measures (incorporated into designs); minor vegetation removal during surveying and training the contractor to prepare for safeguards implementation. The extent of works will be limited to the Phase 1 project area. Setting up large scale construction materials extraction should not be necessary as most materials will be available from commercial sources locally. However, land area may need to be allocated for a concrete batching plant. The location of the concrete batching plant, any other material sources, and waste disposal areas must be identified with necessary environmental clearances in the pre-construction phase. In addition, a holding area for ACM waste may be required within the Phase 1 area, prior to its disposal at the location approved by the authorities.

225. PIC/PIG will need to ensure; (i) climate change adaptation measures are included in the designs to mitigate risks of increased erosion, risk of additional snowfall and rainfall; (ii) AIR is completed and risk to workers and public are avoided and minimized and ACM management is included in the contract(s); (iii) AMP is updated and contractors are made aware of risks from ACM mis-management; (iv) environmental safeguards requirement is included in bidding documents and contract; (v) contractors include sufficient staffing and budgeting for the implementation of the EMP and the AMP and are prepared to implement the plans as in the contract; and (vi) training of contractors, engineers, workers and foremen on EMP and AMP requirements and know how to implement mitigation measures.

1. Site Specific Environmental Management Plan (SSEMP)

226. PIG will ensure that the contractors will be primed and instructed on the need to prepare an SSEMP for construction stage impacts by including the EMP (including **Table VII-4** of this IEE) in the bidding and contract documentation for civil works and by providing disclosure of the IEE. This will include all proposed asbestos management procedures as included in the AMP in this IEE. For avoidance of doubt and for purposes of the eventual contracts, SSEMP means “contractors site specific EMP including AMP”.

227. Prior to commencement of construction works, the Contractor will prepare SSEMP (based on the EMP) on how the Contractor will implement the mitigation measures in the EMP (including AMP). The site-specific information will identify legitimate material sources included in the SSEMP and the proposed methods of asbestos abatement in the AMP section. The minimum content of the SSEMP mitigation measures is included in the construction mitigation section of this IEE and the AMP. The SSEMP will demonstrate the manner (location, responsibilities, schedule/timeframe, budget, etc.) in which the Contractor will implement the mitigation measures specified in the EMP. The SSEMP will be updated as necessary to respond to any unanticipated impacts that may arise as the project is implemented. In a similar way, the AMP section will be updated as required if any additional locations of ACM are identified.

228. The SSEMP will be agreed in advance with PIG in the project preconstruction. SEE approval will be obtained from the state level CEP before the bids are invited from contractors. The requirements in the construction contract agreement will include full implementation of the agreed SSEMP based on the EMP in this IEE. PIG will require the selected Contractor to engage capable and trained staff and / or site agent to take responsibility for routine environmental, safety and asbestos matters under the EMP. A qualified and full-time Environmental Safeguards Officer (ESO) will cover general environmental safeguards matters for the Contractor and environmental management at the working level, while a qualified and full-time Health and Safety Officer (HSO) will cover occupational and public health and safety matters. A Trained Asbestos Supervisor (TAS) will manage the asbestos abatement supported by the trained asbestos workers (TAWs) as required under the AMP. A Community Liaison Officer (CLO) will interact and liaise between the local Hukumat authorities and PIG. One month before construction commences, the Contractor will demonstrate to PIG that the SSEMP will be properly resourced, and a qualified/experienced ESO, HSO, TAS, TAWs and CLO have been identified by the Contractor as per the tender agreement.

229. The PIG-ES will audit the effectiveness of the implementation of the SSEMP for the construction

phase (at least once a week) and review mitigation measures as the project proceeds.

2. PIG checks legitimacy of material supplies proposed by Contractor

230. The PIG will need to check the legitimacy of material supplies proposed by Contractor in the SSEMP and that the proposed material sources comply with ADB requirements, best practice and material suppliers are fit for purpose.

3. Preparation for construction of the Project facilities

231. Minor impacts upon terrestrial habitats and flora of the project area are expected as a result of the surveying, demarcation and clearance of the Project facilities and areas. Surveying and demarcation will cause minor degradation of localized areas through the clearance of small fragments remaining vegetation, but the areas of concern are not densely vegetated and have already been highly disturbed due to the numerous cycles of agriculture over the past 50 years.

232. Plant species outside the farmed areas within the impact area are either ubiquitous native species or in some cases introduced species, which are highly tolerant of drought and disturbances. There is no vegetation that has any conservation significance, and it is not possible to determine if what remains outside the agriculture areas is representative of the original sparse vegetative cover. However, further plantations with grasses and shrubs augmented by geotextiles will enhance erosion control. A Land Acquisition and Resettlement Plan (LARP) will be prepared to establish policies and procedures for payment of compensation for disturbance of remaining crop vegetation or productive areas that will be affected in one way or another by construction and installation of the Project.

4. Site clearance and excavation

233. Due to the highly disturbed nature of the agricultural lands, it seems unlikely that any site clearance, digging and excavation activities undertaken during pre-construction or construction might un-earth physical cultural resources including archaeological and grave sites. However, in the event this occurs, work will cease immediately, and the relevant authorities will be informed. The PIG will be responsible for complying with the requirements of the authorities and monitor them throughout the construction stages. Work will not re-commence in the affected location until agreement has been reached between the authorities and PIG as to any required mitigation measures, which may include structured excavation. Activities will not re-commence until the authorities have signed-off that the site/resources have been dealt with appropriately and that work may continue. The contractor will include a section on “chance finds” in the SSEMP.

5. Health and Safety Training

234. To avoid poor attention to Health and Safety requirements, training will take place as soon as practicable during mobilization and include training on HIV/AIDS and transmission of STD, and transmission and prevention of COVID-19 with risk to workers and public. Training on all health and safety, communicable diseases, and risk of accidents and injuries (especially children[48]) and all matters in the EMMP (**Table VII-4**) will be carried out at the beginning of the mobilization phase.

B. Impacts of Construction

1. Mobilization of the Contractor and Construction Camp

235. Impact: Depending on location the mobilization of the contractor and initial establishment of site office, works yard and work sites, may bring about interaction between local people and construction workers. Provisions must be made for the protection of the environment and to the general public in the vicinity of the work site and camps including advance notice of commencement of works as required by

[48] ALRI will include specific provisions in the bidding documents and contracts requiring that the contractors do not use child labor.

villagers, installing safety barriers and signage or segregation of the work areas.

236. Impacts may result from encroachment on village communal land or access to it. Noise and dust from the camps may affect local villages, construction traffic and impacts to road safety. Competition for potable water and water for hygienic sanitation facilities must be balanced with local village needs.

237. Measures: Prior to contractor mobilization to the site the contractor will identify one member of their staff as Community Liaison Officer (CLO), to be the liaison between the local Hukumat authorities and PIG. PMU will work with the contractor and their Community Liaison Officer (CLO) to establish the communications protocol between the project and communities as per the Project's communications plan. Camps will ideally be located within the Vakhsh River Basin I&D system area but at least 500m away from local populated areas. Prior to contractor mobilization to the site, PIG-ES will work with the contractor to establish the communications protocol between the project constructor and communities to be summarized in a communications plan. The contractor will hire and train as many local workers as possible by using labor from local villages as the work proceeds.

238. Construction camp management plan will be prepared in reference to World Bank Group's Workers' Accommodation: Processes and Standards,[49] as part of SSEMP and implemented. The contractors will adopt good management practices to ensure that fuels and chemicals, raw sewage, wastewater effluent, and construction debris, excavated and scarified material are stored and disposed of in controlled conditions to reduce the risk of contamination. Wastewater effluent from contractors' facilities, workshops and equipment washing-yards will go through wastewater treatment facility (including septic tanks for domestic wastewater and oil-water separator to remove oil and grease) provided by the contractor. The oil and grease from the oil-water separator will be treated as hazardous waste. Wastewater which does not meet the relevant standards (**Table I-3**) will not be discharged to the environment. Clarification from CEP will be obtained in detailed design stage on the disposal of all wastes and the method and destination for disposal. PIG-ES will ensure measures to minimize disturbance by construction workers and presence of the works site/areas include all measures in the EMMP.

2. Impacts on air quality; construction plant and vehicles generating emissions

239. Impact: The air quality of the project area is generally good due to lack of major industry and only moderate traffic on local roads. During the construction phase, the civil works will have a minor and temporary impact on local air quality through emission of exhaust from construction vehicles as well as through dust generation from vehicles transporting materials and from small stockpiles of construction materials. However, these impacts should not be great given the scale of the works in the open air. It is probable that emissions will be rapidly dissipated in the spacious terrain.

240. Dust and other particles re-suspended from Vakhsh River Basin I&D system unsealed surfaces and excavations will be the main sources of dust. The works in any given area will generally be of short duration and there will be sufficient buffer distance to the local communities such that minor impact is expected from the construction works on residential sensitive receptors near in terms of noise, vibration, and dust. Also works are not expected to take place at night except in special circumstances justifiable to the PIG. Dust from works with ACM is dealt with separately.

241. As construction is progressed, the improvement of the surfaces around Vakhsh River Basin I&D system will result in reduction of dust emissions overall as a result of sealing many areas and proper compaction and treatment of other surfaces.

242. Measures: The PIG-ES and PIC will need to check the operation of construction plant and equipment creating fumes, smoke and dust and ensure that machinery is fit for purpose and can minimize fumes, smoke and dust nuisances that may otherwise cause respiratory irritations or illness on workers and nearby community. Qualitative air quality monitoring by observation and quantitative air quality

[49] A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards (ifc.org) (August 2009)

monitoring (PM10 and PM2.5) in response to complaints or as required by environmental authorities[50] will be conducted as necessary. There are a number of good engineering practices that are included in the EMMP that can be employed to ensure that any air quality impacts generated during construction and operations are mitigated, including all measures in the EMMP.

3. Noise Impacts from Construction

243. Impact: Construction activities will produce noise. Noise impacts may be short lived, although can be very intrusive if not controlled properly. Construction noise is generally intermittent, attenuates quickly with distance, and depends on the type of operation, location and function of equipment. During construction, there will be temporary adverse impacts due to the noise of the construction equipment, especially heavy machinery, when construction activities are carried on in the vicinity of the Hukumat / jamoats. The most sensitive receptors in the Hukumat / jamoat are residential areas, churches, health clinics and schools. Cooperation between the contractor and the residents is essential and it is the responsibility of the contractor to arrange meetings between these parties and arrange such matters as work schedules (hours of equipment operation etc.) locations of work camps and material storage areas, and the locations of equipment away from settlements in the Hukumat / jamoats.

244. The project will cause negative impacts through presence of vehicles and equipment. Inconvenience, minor disruptions to traffic on the surrounding roads as well as on local access to and from the Hukumat / jamoat villages during the construction period.

245. Measures: Aggregate processing is one of the noisiest activities required in construction processes, however, if necessary, this will be undertaken at a designated site located at least 500 m away from the nearest sensitive receptors. Noise measurement will be undertaken in response to complaints or as required by environmental authorities[51] using handheld noise meter and will follow the methodology specified by the manufacturer. In response to unresolved complaints background and impact noise will be measured in dB(A) covering the relevant periods (i.e., 6h to 18h, 18h to 22h and 2h to 6h). Measurement will also be taken to establish if the commonly used EHS Guidelines (See footnote 10) criterion of Leq55 dB(A)1-hour is exceeded at the measurement points. If it is exceeded by the existing noise, a criterion of background +3 dB(A) will be applied in the impact monitoring. Works are not expected to be carried out at night but if this is unavoidable for unexpected reasons, separate measurements will also be taken before construction commences to establish if the EHS Guidelines criterion of Leq45 dB(A)1-hour is exceeded and the monitoring assessment criteria will be established accordingly. Mitigation of impacts including the ones on access and traffic are included in the EMMP.

4. Impacts from excavation of trenches for infrastructure or foundations.

246. Impact: Trenches and other excavations for extensions of infrastructure such as I&D pipelines, and foundations for canals, flumes and inspection chambers on water supply pipelines and replacement buildings will be required in many locations. Deep trenches (>1.5 meters) or greater, in weak or difficult soils may be prone to collapse and require a protective system to shore up the trench sides (unless the excavation is made entirely in stable rock). Excavated materials stored near the trench may slip back into the trench.

247. There will be inevitable disturbance to crops. Even if most of the pipelines are not disturbed underground, some crops will be affected as access will be required to each the hydrants and improve the access/ inspection chambers. Access may be by existing tracks and roads but may also be across farmland and through homesteads. There is about 564 km of buried pipeline to be modernized but access is mostly only needed to the hydrants and to the access chambers to the drainage pipe systems. Preliminary estimates indicate access is required to about 192 km of the system. Access for machinery and vehicles needs to be about 4.0 m wide giving a total area of 76.9 ha. For impact on crops

[50] Monitoring required by environmental authorities will be determined through the SEE procedure (Chapter I.A.4.b).
[51] Same as footnote 50.

compensation will be paid.

248. Measures: Engineering controls for shoring applications will be provided giving assurance that work in difficult soils is safely planned. This will be developed (in principle on how conduct work in difficult soils) by the PIC in the detailed design stage and included in the contract. A shoring plan will be included by the Contractor in SSEMP in the pre-construction stage to provide details of how the contractor will protect worker safety while conducting work in weak soils. The details of the protective system will be a requirement of the contract and included in the contractors shoring plan in the SSEMP.

249. Engineering controls for shoring applications will be required as follows:

- Prior to excavations, prepare all materials on site to complete the shoring of excavations;
- The principles for trench safety developed by the PIC for work in difficult soils will be followed and the Contractor will implement the shoring plan included in the SSEMP and approved by the PIC;
- Provide shoring for deep trenches (>1.2m or greater unless the excavation is made entirely in stable rock);
- Provide safe means of access and egress from trench excavations;
- A stairway, ladder, ramp or other safe means of egress will be located in trench excavations that are 4 feet (1.2m) or more in depth so as to require no more than 25 feet (8m) of lateral travel for employees [If possible, the grade should be away from the excavation];
- PIG-ES to inspect and approve the shoring (in writing) if it is properly constructed; and
- Carefully stockpile excavated materials in a location where they cannot slip or be washed back into the trench.

250. Prior to excavations, the necessary information and interaction with the local community will take place. Compensation for the disturbance will be paid before the works commence. The SSEMP will include measures to control physical impacts. Most materials will need to be reused as backfill but careful stockpiling and reuse of any surplus soil or subsoil as covering or fill for other project works will be required. Practices to ensure that any impacts generated during excavation are mitigated include all measures in the EMMP.

5. Impacts on water resources – construction requiring water supply

251. Impact: The water supplied to the completed project will not exceed that which is already agreed with the authorities and improvements will result mainly from more efficient use of water and reducition and elimination of unecesseceary losses. Demands on local water supplies from construction activities are as follows: a) local water supplies will need to be tapped to meet campsite and construction requirements, so bringing project based water use into competition with local use; b) surface and subsurface water resources are located within the Vakhsh River Basin I&D system area but sufficient water supply must still be allocated for consruction purposes.

252. Measures: Mitigation measures are included in the EMMP.

6. General activities – solid and liquid waste management

253. Impact: Uncontrolled waste disposal operations can cause significant impacts. Main wastes during construction phase are debris, spoil and garbage. If not properly handled and disposed they can cause impacts. Insufficient proper solid waste disposal can cause spreading of different diseases. Population growth in Yovon has increased waste generation and the solid waste management system needs to be improved.

254. The major impacts from the inefficient municipal solid waste are: (i) dispersed solid waste from open dumps creates unhygienic conditions, (ii) breeding flies on open solid waste are effective vectors spreading disease in the community; (iii) food waste in open dumps provides attractive harborage for rats spreading disease, damaging electrical cables and other materials; (iv) waste may block drains or trap water, causing breeding grounds for mosquitoes spreading malaria and dengue; (v) open burning of solid

waste causes air pollution; (vi) discarded waste especially polythene bags causes aesthetic nuisance and possible death of animals if ingested; (vii) open dumps at roadsides create traffic blockage; and (viii) dangerous items (broken glass, razor blades, hypodermic needles and other healthcare wastes, aerosol cans and potentially explosive containers and chemicals from industries) may cause risks of injury or poisoning.

255. Whereas the exact amounts cannot be predicted, the solid waste arising from the Project construction should not be large and with proper planning, disposal should not be major problem.

256. Measures: Practices to ensure that any impacts from solid and liquid wastes are mitigated include the measures in EMMP. ACM disposal will follow the prescribed methods in the AMP in the EMP.

7. Use of Hazardous Materials and Waste Disposal

257. Impact: Use of hazardous substances such as oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed correctly. Oils and lubricants discharged to vegetated areas can kill the roots and destroy the plants, are resistant to microbiological decay mechanisms and may remain hazardous for long periods.

258. Measures: Vakhsh landfill has been identified for the disposal of hazardous waste. The site is monitored by CEP as one of the candidate sites for the disposal of hazardous waste including ACM waste. The Vakhsh landfill site is located in the Khatlon region, in the southwestern direction from the district center Vakhsh. The distance from the landfill to the center Vakhsh district is about 30 km. The area of the landfill is about 12 ha. The distance from Yavan district (pilot zone) to the landfill Vakhsh district is about 130 km. It is functioning as of 2020 and is being used for the different types of hazardous waste, including ACM waste.[52] At the detailed design stage, PIG will further coordinate with the CEP to explore other candidate disposal sites as well to identify the most appropriate option to use to dispose hazardous waste. In addition, some other routine control measures in the EMMP will help to mitigate impects.

8. Asbestos Management and Asbestos Containing Material (ACM) Waste Disposal

259. Impact: ACM are known to be present in the form of asbestos cement I&D pipes but the condition, type and concentration of asbestos in the ACM is not known in detail at this IEE preparation stage. It is not known if other parts of the system contain ACM. Detailed asbestos investigation and reporting will be conducted starting from the detailed design stage throughout the project implementation stage.

260. Asbestos management is a major consideration because the I&D pipes installed up to 50 years ago are presumed to be a cement-based ACM; with significant asbestos content based on anecdotal information. However, the ACM is believed to be “low risk” as the asbestos fibers are bound in the cement matrix of the pipes and cannot be liberated to the atmosphere easily, even if unearthed. Such low-risk ACM can however liberate significant amounts of asbestos fiber, if it is cut with power tools such as abrasive wheels or powered saws. Therefore use of power tools to cut asbestos pipes must be prohibited. If power tools are used for cutting ACM, the work will become higher risk. Even when wet such cutting is difficult to control to the level where there is no significant fiber release.

261. There are reasons to suspect that there are other locations in the IRDVRM project site where typical suspect ACM may have been used such as: (i) water pumps; (ii) cement pipes serving inspection chambers and off-take gates; (iii) curved cement flumes and concrete channels. As the system was constructed in the 1960s and 1970s, when asbestos was in common use, representative sampling will be undertaken from other typical cement sections and other typical locations for ACM. Replacing and upgrading the existing buried asbestos-cement pipes in the secondary and tertiary I&D systems is therefore a critical environmental issue.

[52] source: Environmental Performance Review report, UNECE (2017)

262. Knowledge of the type, condition and form of ACM is important because these affect the risks. Low risk materials are generally not friable and may be enclosed or encapsulated such as in the case of the ACM pipes in IRDVRB. High risk materials are friable (surface disintegration with rubbing by fingers) and exposed in enclosed spaces. However, low risk materials can be made high risk if, for example, asbestos-cement pipes are cut with powered abrasive saws so releasing large amounts of fiber that is difficult to control. Therefore the form, type and condition, as well as the way the asbestos in handled and removed, affect the methods needed for asbestos management or abatement.

263. Measures: The condition of the buried ACM pipes is not fully investigated and will need to be detailed further in an AIR during detailed design stage. Because ACM is present in some places, there is a need for a precautionary approach and to rule out ACM in other parts of the system to meet best international practice[53]. Initial inspection indicates pipe condition will vary from place to place and ACM pipes appear to have degraded to a greater degree where subject to exposure to groundwater that may be high in sulphate.

264. An International Environmental Specialist with strong expertise in asbestos abatement and management (IES) will be mobilized under the PIC to prepare the detailed AIR and update the AMP at the detailed design stage with comprehensive measures for identifying, planning and ensuring safe handling, transport and disposal of ACM cement pipes that need to be replaced. New pipes will be either HDPE or steel but joining the old cement pipes to the new must achieved in a way that will not fracture, abrade, or disintegrate the pipes and cause significant release of asbestos fiber that could pose an unnecessary health risk to workers or public.

265. Those at most risk are workers employed to separate out and replace the old asbestos cement pipes and join them to the new pipes; who must also ensure the pipes are segregated and disposed in a way that poses no unacceptable risk. For these workers, precautions to be taken include: (i) protection of workers by excluding work practices that will increase risk of fiber release; (ii) use of Personal Protective Equipment (PPE) such as protective face masks, overalls, clothing, bootees and gloves; (iii) use of appropriate tools (no power tools - for separating and removing where necessary); (iv) connecting serviceable asbestos pipe sections in situ for reuse; (v) a method to join serviceable ACM pipes to replacement pipes without risking significant fiber release; (v) adoption of controlled wetting to minimize airborne fiber release; (vi) ensuring no restriction of ventilation; and (vii) restricting access to only essential workers and supervisors in those areas where work with asbestos must take place.

266. Separated ACM will need to be wrapped in heavy gauge polythene, sealed and carefully removed and transported to an area for safe disposal as agreed in advance with the environmental authority. The AMP will meet internationally accepted Standard practice for the maintenance and repair of installed ACM asbestos-containing products, and it will be a requirement that the SSEMP (including updated AMP) also meets this Standard and is adequately monitored throughout the works. ACM waste will be kept separate from other waste and the handling will be under trained workers supervised by trained foremen capable of ensuring the subsequent transportation is followed using tracking systems to ensure delivery to the destinations for final disposal by burial, there will be no unofficial ACM waste gathering by casual waste collectors and no recycling or reuse of ACM for other purposes.

267. The AMP is an integral part of the IEE and EMP and is presented as a stand-alone document in line with best international practice in **Annex 1** to the IEE. In order to make sure that ACM is managed according to the AMP (updated by the PIC IES at the detailed design stage) and that contractors adopt specified work practices as prescribed in the AMP the contractor must recognize and follow the prescribed methods: (i) sign off that the Contractor and the requisite capable staff have read the AMP, understand the risks and will be able to follow all aspects of the AMP for the duration of the project; (ii) identify suitably capable staff to be TAS and TAWs to be exclusively trained and employed for the

[53] UK Health and Safety Executive, Control of Asbestos Regulations 2012 No. 632

specialist asbestos abatement work; (iii) provide all necessary equipment and material specified in the AMP sufficient for removal of all ACM requiring removal in the work and provide inventory of materials and equipment to PIG before works commence; (iv) follow all instructions and methods from asbestos awareness training by reputable qualified IES and follow all supplementary instruction from ALRI / PIG / PIC in line with the updated AMP; (v) incorporate all AMP and updated AMP requirements in the SSEMP as per in contract specification; (vi) require new and established staff (TAS and TAWs) to undergo refresher asbestos worker training; and (vii) follow all requirements of the updated AMP and follow all supplementary instruction on locations and methods of removal, handling, wrapping, transportation and disposal of ACM from CEP, ALRI / PIG / PIC in line with the updated AMP.

268. Identification, removal, handling and disposal of ACM will follow the prescribed methods in the AMP. A thorough asbestos investigation will be acarried out in the deteailed design stage and the AMP in this IEE will be updated accordingly. The Contractor (monitored by PIG-ES) will undergo specialist training for the asbestos work, and ensure that all measures in the AMP are strictly followed including removal, safe storage of all wrapped packages of ACM waste and necessary approval/permit for disposal are obtained from CEP and local authorities before the works commence. The Contractor must follow directions in the AMP for identification, work with asbestos, labeling, removal, handling, transportation and disposal of ACM waste. PIG-ES will monitor all wrapped ACM waste packages from source to disposal (cradle to grave) following directions in AMP. If unexpected ACM is identified, inform PIG-ES (and PIC) and await updates on AIR and AMP as necessary for labeling, removal, handling, transportation and disposal of ACM waste. Reuse or sale of ACM waste pipework or other ACM will be prohibited.

9. Accidental damage to existing services, utilities, and infrastructure

269. Impact: Disruption to existing potable water supply pipes, telecommunication lines and electrical power lines may be necessary to complete the works, but the locations and scale of this will only become evident at the detailed design stage.

270. Measures: The PIG-ES and construction contractor will consult with all relevant authorities to ensure that they minimize any disruptions to existing infrastructure and services to other operators. This includes mahala / Hukumat / ALRI water supplies, sewers, telecommunications infrastructure, and electricity supply wherever applicable.

10. Borrow and quarry, sourcing of construction materials

271. Impact: Opening and operating of borrow pits can result in multiple environmental and social impacts, including degradation of production soils, flora and habitat, impacts to air quality, elevated noise levels, etc. No specific quarry sites have yet been identified for this project. However, within the vicinity of the Project corridor, there are some acceptable sources.

272. Measures: The volumes of required material will be estimated after the detailed design. Sources of construction materials (gravel, aggregate etc.) for the Project will be agreed with the local authorities prior to commencement of works. The contractor will be required to identify sources and prepare a sustainable extraction plan, for all sources of material that will be used in Project works from quarries and borrow sites acceptable to PIG and licensed and authorized by CEP. The aggregate extraction plan will be submitted to CEP, which will approve and monitor implementation of the extraction plan.

273. To mitigate the impacts from extraction sites, in addition to the preparation of the site specific extraction plan by the contractor, the bid and contract documents will specifically require contractors to: (i) balance cut and fill requirements to minimize impacts from extraction of aggregates; (ii) prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly and report to PIC and minimize impacts on other local resources; (iii) procure materials only from quarries and borrow sites acceptable to CEP or licensed and authorized by CEP; (iv) required environmental clearance from CEO if required shall be secured prior to operation of quarry/borrow areas; and (v) borrow/quarry sites will not be located in productive land or forested areas.

274. The locations will be agreed with the authorities with highest ratio between extractive capacity (both in terms of quality) and loss of natural state. Borrow pits will be refilled as required by CEP using inert surplus spoil material. Upon completion of construction, borrow areas will be backfilled or temporarily fenced, awaiting backfilling, to prevent and reduce wind and water erosion, and generation of dust. The contractor will ensure borrow pits are left in a tidy state with stable side slopes and proper drainage to avoid creation of water bodies favorable for mosquito breeding. The excavation and restoration of sites and borrow areas, as well as their immediate surroundings, will be undertaken in an environmentally sound manner to the satisfaction of the PIG / PIC.

11. Accidental encroachment into historical and cultural sites

275. Impact: There are no known sites of physical and cultural resources in the Project area. Consultations indicated no such resources are in the Vakhsh River Basin I&D system area that might be directly affected by the Project.

276. Measures: If any cemeteries or religious sites are unearthed during the course of the Project works, the site will be fenced and segregated so as not to disturb it during construction and to preserve access for devotees. The Contractor will include a section on “chance finds” in the SSEMP. Any accidental discovery of physical cultural resources will be handled as per the provisions set out in EMMP after referral to the local Department of Culture (of the regional Hukumat) that is subordinate to the Ministry of Culture (MOC) with referral to the State level if necessary under the law for protection of cultural heritage.

277. Mitigation measures for potential impacts on physical cultural resources will include: (i) site agents will be instructed to keep a watching brief for relics in excavations; (ii) Should any potential items be located, the PIG-ES will immediately be contacted and work will be temporarily stopped in that area; (iii) PIG with the assistance of the ALRI will determine if that item is of potential significance and contact ALRI to pass the information to the MOC who will be invited to inspect the site and work will be stopped to allow time for inspection. The MOC and PIG will agree any required mitigation measures, which may include structured excavation. The Contractor will be responsible for complying with the requirements of the MOC and the PIG will monitor them accordingly. Work activities will not re-commence until the MOC has signed-off that the site/resources have been dealt with appropriately and that work may continue.

12. Construction Impacts on the Biological Environment

278. **Impacts on habitat and flora**. Minor impacts upon terrestrial habitats and flora of the project area are expected as a result of the project activities. Habitat fragmentation occurs when construction cuts into an ecosystem. The core Project area has been worked on for more than 50 years and the steppe desert-ecosystems surrounding have been kept at bay by agricultural practices. To some extent pioneer vegetation has re-established in some place, albeit as altered units around the Vakhsh River Basin I&D system. There are no critical habitats in the Project area, they are all man-made.

279. Activities will take place entirely within the Vakhsh River Basin I&D system or within areas already subjected to partial clearing in the past. There will be limited and minor, if any, impacts on the remaining disturbed habitat, flora or fauna. Construction work will directly cause minor degradation of local ecology through the clearance of small areas of sparse vegetation at work sites and material stockpiling areas if required. Construction activities will impact only the areas within the Vakhsh River Basin I&D system.

280. Plant species present within the impact area are either introduced species or ubiquitous native species, which are highly tolerant of disturbances. There is no vegetation in the Vakhsh River Basin I&D system area that has any conservation significance nor is it representative of the original vegetative cover which has degraded due to the effects erosion and desertification. There are no gardens, plantations and no individual trees that might require removal although gardens, homesteads and plantations are a feature of the surrounding area. The species present in the Project area are non-endemic, common and

have no special characteristics to merit protection. However, replanting with grasses and shrubs will assist in surface stabilization to reduce dust as a form of enhancement. An LARP will be prepared to establish policies and procedures for payment of compensation on any crops to be removed.

281. **Impacts on precious ecological fauna.** In terms of impacts on fauna, there is very little potential for construction workers to poach edible animals and birds of the locality, and this is thought unlikely given the scarcity of edible animals in this landscape. There are no collectible species.

282. Measures: The contractor and operators will be responsible for providing enough food and adequate information to workers regarding the protection of fauna and imposing sanctions on workers trapping, killing or wounding birds or other wildlife. Invasive species will not be introduced. During replanting/revegetation works, new alien plant species (i.e., species not currently established in the region of the project) will not be used unless carried out with the existing regulatory framework for such introduction. All tree cutting and compensatory tree planting (if necessary) will be planned in full agreement with the local forest authority (Department of Ecology of the regional Hukumat) (There is no official regulation on tree cutting compensation in Tajikistan.). Pistachio trees may offer a favorable plant for reestablishment due to their wide spreading root system. Other mitigation measures are included in the EMMP.

13. Occupational Health and Safety Risk

283. Impacts: Injuries from incorrect lifting of heavy objects and falls from height are generally the two most common causes of accidents at work. In the case of the Project, there are also added complications of work near deep water in the canals. Other potential impacts to the workforce include exposure to lubricants and fuels and other skin irritants or dust and noise. Lack of knowledge about good healthy and safe working practices can create physical and chemical hazards. Lack of control of solid waste can create biological hazards through harborage for pest species. Improper disposal of liquid effluents can introduce hazards from exposure to chemicals or groundwater contamination and insufficient drainage on sites may create ponding that encourages mosquitos.

284. Occupational health and safety in Tajikistan are generally governed by the various regulations and codes listed in **Table I-1** covering mechanical safety, hygiene and sanitation and road safety. These encompass the fundamental principles of health and safety in the workplace and are legal requirements in Tajikistan. The contractor's SSEMP will address these requirements and describe how worker health and safety will be established by the contractor using routine safety measures for all physical hazards from lifting, falls from height, welding, and other hot work, as required by the GOST labour codes (**Table I-1**) and by good engineering practice.

285. In some cases the work force will have to work near canals or other deep-water courses. Workers will also need to excavate and work in deep trenches. The workforce must be made aware of risks from falling and especially from drowning where work is near deep or fast flowing water. Another hazard may result if a trench (excavated for access to irrigation or drainage pipes) should accidentally become filled with water, either from rain flooding, natural drainage or from accidental leakage or discharge from another part of the irrigation or drainage system.

286. Measures: The contractors SSEMP will make provisions for general health and safety requirements, including provision of training in the use of PPE, other safety equipment, lifting gear and other mechanical aids for workers. Training of the workforce for occupational health and safety will be covered in the mobilization phase. These provisions will aim to eradicate or minimize the risk of accidents at the work sites. The construction camp will be equipped with a health post which will include first-aid and basic medical supplies. To reduce the risk of incidents at the camp from interaction with the community, access to construction camps and works areas by other than those authorized will be prohibited. Use of power tools, grinder wheels and mechanical saws to cut ACM pipes will be strictly prohibited.

287. Workers having to work near canals or other deep-water courses will be instructed in safe procedures for work near water. Flotation devices will be available at the worksites near canals with flowing water deeper than 50cm. Work in deep trenches (more than 1m deep) will only be carried out when the water source in the irrigation system to the relevant area has been turned off and isolated. During flushing of water through drainage and irrigation pipes workers will exit the trenches during times when the water if flowing or if water levels in the trench accidentally rise above 50cm deep.

288. Potential sanitation impacts from disease will need to be controlled by segregating workers from the civilian population, maintaining hygienic conditions in the worker camps and implementing the social and health awareness programs for the construction and operation of the Project.

289. The contractor will provide warning signs at the periphery of the site to delineate the work areas and also informing the public not to enter. The contractors will provide information boards near the work sites to inform and instruct workers on how to conduct themselves and to be aware of their surroundings if they must approach the public. Information boards will be refreshed as necessary and also show the name and telephone contacts in PIG and contractor's offices for complaints about the works (via GRM). Information boards will also state that the PIG and contractor have an open-door policy as regards complaints. The contractors will implement work health safety measures as included in the EMMP.

14. Community Health and Safety Risk

290. Impacts: The project's construction phase may result in a range of public health and safety impacts through interaction of communities with workers and the works, particularly for pedestrians and children that can be threatened by the excavation and general construction. The presence of construction workers and work camps can induce or increase risk of spread of communicable diseases.

291. Potential sanitation problems and impacts from diseases will need to be controlled by maintaining hygienic conditions in the worker camps and ensuring effluents and solid waste are controlled in line with local CEP requirements and by implementing social and health awareness programs for the Project.

292. Public safety, particularly of pedestrians and children can be threatened by the excavation of the trenches for irrigation and drainage renovations and the movement of project vehicles.

293. Transmission of sexually transmitted infections (STIs) and Human Immuno-Deficiency Virus (HIV) is a potential impact of the construction phase. Risks posed by construction workers engaging in either commercial sex or sexual relationships with local people are covered in the mobilization/induction training.

294. Measures: The plans to include provisions for work site security and guards, trench barriers and covers to other holes and any other safety measures for workers will be equally applicable to the public. The contractor will provide warning signs at the periphery of the site warning the public not to enter. The contractor will restrict the speed of Project vehicles and also control traffic by contra-flow and provide flag men and warning signs near the works if the traveling lanes must be temporarily reduced. Within 100m of settlements and towns fencing will be installed prior to excavation work commencing on all sides of temporary excavations.

295. Within 100m of the settlements and homesteads, fencing will be installed prior to excavation work commencing on all sides of temporary excavations and the edges of the canals and other waterways will be clearly marked. Where these are near roads temporary directional reflective road signs will be installed that are visible day and night. The plans will include provisions for site security and guards, trench barriers and covers to other holes and any other safety measures as necessary. The contractor will restrict the speed of project vehicles and also control traffic by contra-flow and provide flag men and warning signs at either end of the works where the road traveling lanes must be temporarily reduced.

296. The contractors will provide information boards near the work sites to inform and instruct the

public on how to conduct themselves and to be aware of their surroundings if they must approach the works. Information boards will be refreshed as necessary and also show the name and telephone contacts in PIG / PIC and contractors offices for complaints about the works. Information boards will also state that the PIG / PIC and contractor have an open-door policy as regards complaints. The contractors will enhance the public safety by implementing both worker and public health safety measures as included in the EMMP.

15. COVID-19 Protocol

297. Impact: Corona virus disease 2019 (COVID-19) is an infectious disease that affected the whole world. This disease has implicated social and economic aspects worldwide including Tajikistan. The spread of the disease will cause delays in the progress of almost all construction activities. This Prevention Protocol is intended to provide guidance on addressing key issues associated with COVID-19 if the pandemic continues during the project implementation.

298. Measures: The contractor will prepare COVID-19 health and safety management plan and emergency response plan as part of the SSEMP. The Prevention Protocols of COVID-19 are as follow:

- ALRI, engineers and contractor will form a COVID-19 prevention task force.
- COVID-19 prevention task force is responsible for socialization, education and COVID-19 prevention during the project implementation.
- The task force together with medical staff must discuss, advise, campaign on COVID-19 prevention techniques in every socialization activity and follow up with counselling activity.
- Install posters about the appeal or advice to prevent COVID-19, such as washing hands, wearing mask, installed in strategic places on the project site.
- Medical personnel will check every worker's temperature morning and evening. Persons that are sick with a temperature indication of ≥38 ℃ will be prohibited from the project site.
- Assess workforce characteristics by identify the vulnerable group of COVID-19 including elderly people and those with underlying health issues.
- Conduct virtual meetings if necessary and implement physical distancing for direct meetings and field work as far as practicable.
- Provide PPE to prevent COVID-19, Make wearing a mask a normal part of being around other people.
- Continue with the usual environmental and social management training, adding self-hygiene and COVID-19 related training as appropriate.
- Assess the extent to which work schedule needs to be adjusted (or stopped) to reflect prudent work practices, potential exposure of both workers and the community and availability of supplies, taking into account Government advice and instruction.
- The community will be made aware of all measure being implemented to limit contact between workers and the community, procedure for entry/exit to the site, the training being given to workers and the procedures that will be followed by the project if a worker become sick.

C. Impacts of Operations

Negative Impacts

1. Air impacts during operation

299. Impact: During the Project operation, impacts on air are mainly from dust and vehicles and traffic due to the general farming operations. The pumping stations will be electrically driven with no emissions. During the operation of ongoing and future investment inside Vakhsh River Basin I&D system, the nearest sensitive receptors will be at a distance from noise and pollution sources in the active work areas, and there will be ample attenuation of noise and air pollution due to the distance and open terrain. It is unlikely that significant operational traffic would need to pass near sensitive receptors given availability of various routes.

300. Measures: Water will be sprayed if fugitive dust is being generated, and more frequently during windy days. Operational equipment will need to be maintained to an acceptable standard and checked to ensure they are kept in good working order. Use of equipment and machinery that causes excessive pollution (i.e. visible smoke) will be prohibited and vehicles transporting potentially dust-producing material through built up areas will not be overloaded, will be provided with adequate tailboards and sideboards, and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides, and tail of the vehicle) during transportation. All vehicles will be required to comply with Tajikistan's emission standards (**Table I-1**) as part of the conditions to environmental clearance by CEP and checked by ISI and ISH. Maintenance schedules can be formed to avoid nighttime and near sensitive receptors and planned discussions with the community to establish mutually convenient work schedules will avoid complaints.

2. Solid waste

301. Impact: The Project operation will not lead to any significant increase in population thus no rise in municipal solid wastes is expected. During routine and ongoing maintenance, wastes will arise from unblocking pipes and clearing channels so as to relieve constriction of water flows through I&D pipes.

302. Waste arising from the operating agriculture will depending on the nature and scale of the field practices. The waste arising from the Project's working population is difficult to estimate without details of farming operations and the types of waste but looking at just a few aspect of operations for any farm, waste will be generated from agricultural solid wastes typically produced from agricultural activities involving crop production, e.g. solid wastes, crop residues, husks, solid wastes generated from cultivation and maintenance of fruit bearing plants, pruning and grass cuttings. However much of these materials can be reused for mulching or composted for soil amelioration.

303. Nonagricultural wastes may result from support activities such as (i) workshops and maintenance engineering; (ii) offices (accounts, purchasing, human resources, sales, and marketing etc.); and (iii) food shops or canteens. However whereas there may be some increase in the scale of operations for Vakhsh River Basin I&D system, this is not likely to overwhelm current systems and no expanded or new facilities for collection and disposal of solid waste will be required. The operational landfills currently serving Yovon to an acceptable standard will continue to operate for the foreseeable future.

304. Measures: When removing and disposing the blocked materials to clear canals and pipes, ALRI/PIG will follow existing waste disposal requirements to the designated waste disposal areas that are acceptable to CEP and generally follow waste disposal requirements as under construction phase.

305. Composted mixtures of decayed organic materials that would otherwise be wasted are well recognized and used locally to enhance soil fertility and composted manure improves soil and increases fruit and vegetable yields and reduces crop diseases. Additionally composting confers other number of environmental benefits such as improved soil biodiversity and moisture retention. Furthermore, use of manure for compost means less waste that could otherwise make its way into irrigation water. In addition,

there may be process wastes from adding value to agricultural products before market.

Positive Impacts

3. Reduced impacts from excessive use of agrochemicals

306. Excessive use of pesticides, insecticides and herbicides can generate impacts as well as from pesticide containers or bottles. Agricultural activities may to some extent depend on the use of pesticides, insecticides, and herbicides, being handled by many uneducated and untrained farmers possibly resulting in abuse by these farmers and may farmers mishandle pesticide containers, but these impacts are presently unpredictable. However pesticides are too expensive for many farmers and households and farming techniques such as crop rotation, fertilization and irrigation are preferred to support cultivation. Natural pesticides made from ingredients such as pepper, onion and garlic are also used.

307. There are 472 chemical and biological products permitted for application in the Republic of Tajikistan (as approved by the Commission on Chemical Safety in the Republic of Tajikistan in 2004); including 182 pesticides and other agrochemicals. Some of them are already banned in many countries but continue to be used in Tajikistan. The use of pesticides on cotton crops is reported to be decreased in recent years.[54] Unfortunately, in the modern conditions of rural farms there is no effective system of accounting for use agrochemicals and tracing the agrochemical use is not currently possible due to lack of available funds. Therefore obtaining significant information on the use of agrochemicals is not yet possible. However there are national projects and programs on phasing out the use of persistent organic pesticides, but major challenges are being encountered.

308. Output 2 of the Project includes higher value diversified cropping with integrated pest management (IPM) and integrated nutrient management (INM) with data informed decisions for crop choice and marketing, and improved practices to achieve higher crop yields less vulnerable to drought/intense storm events. This is expected to reduce the impacts from excessive use of agrochemicals. This is expected to be implemented over the whole area (all 17 WUAs, covering 9,600 farmers). Training NGO will be engaged for about 3 years for this.

4. Reduction of conflicts in Water Supply

309. Conflicts in water supply will be mitigated by the Project. Under Output 2 of the Project, the water management and operation of the I&D systems will be strengthened: (i) ALRI's management, operation and maintenance will be improved with modern flow control and remote monitoring systems for improved services to WUAs and farmers and satellite based remote sensing for monitoring of major crops; (ii) WUA's management, operation and maintenance will be improved by providing specialized maintenance and training services, volumetric metering of water supply and erosion control and mitigation implemented to stabilize and reclaim eroded areas; and improvements to farm level and homestead irrigation practices to improve productivity. These measures will be developed as part of the Project implementation to upgrade water use management practices.

310. At the interstate level, within the framework of the activities of the International Water Coordination Commission of the Central Asian countries, limits on water intake from the main rivers are set annually. On the Vakhsh river, water intake is controlled at the head structure located at PK0+00 of the Yovon hydroelectric complex (Figure II-2). From PC 0+00 the water is channeled to the right and left branches of the Vakhsh River Basin irrigation system. Therefore, after modernization, it will not be possible to abstract more water than the established limit. As determined earlier, the projects will not consume more water than is already permitted by current agreements.

311. The project will ensure water will be conserved by better management and reduction or elimination of losses and in compliance with environmental clearance from CEP. Water supply rights will

[54] http://www.ecoaccord.org/news2021/HHPs-in-Tajikistan.pdf

be managed by the inclusive and reliable integrated water resources management (IWRM) which will be introduced as part of the Project. The Project will pay special attention to woman headed households by encouraging their participation in Water Users Associations (WUAs) and ensuring their participation in project-funded training and other events.

5. Reduction of Leaching of soil nutrients and changes in soil characteristics

312. Leaching of soil nutrients and changes in soil characteristics will be mitigated by the Project. If the irrigation systems are not used properly, excessive application of irrigation water may induce leaching of soil nutrients and changes in soil characteristics. However, under Output 2 of the Project, the measures introduced for better water management will overall improve soil conservation and management practices to reduce excessive leaching and improve the nutrient status of soils as part of the Project implementation to upgrade water use and soil management practices.

6. Social Impacts

313. Improvements are generally expected in farm level and homestead irrigation practices and productivity are designed to lead to higher value diversified cropping and marketing, and practices to achieve higher crop yields; all planned to result in higher incomes. Being less vulnerable to drought and intense storm events, improved crop water productivity and greater land area operated by women farmers, and more women participating actively in WUAs will be supported with expected improvement in productivity and income generation. The improvements to the access roads should improve roads safety in the operational phase.

VI. Information Disclosure, Consultation, and Participation

A. Stakeholder Identification

314. A number of consultation meetings were held between August 2020 and April 2021 for the preparation of this IEE. Three formal public consultation meetings were held in Yovon, Khuroson and A.Jomi district in September and October 2020. The main system works (right branch canal and associated structures) and the works for two pumping stations were the focus. Additional consultations were held in April 2021 focusing on I&D pipe systems for the core area of 9,827ha to be modernized and upgraded.

315. The objectives of the stakeholder consultation process were to disseminate information on the project and its expected impacts, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of project design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the Project implementation and to suggest appropriate mitigation measures. The feedback received has been used to address these issues at early stages of project design.

316. The stakeholders consulted for the project included local affected persons, local authorities and community, national authorities and other groups with an interest in the area where the project will be implemented. Individuals representing persons from numerous family groups in the community around the project were informed about the project and invited to comment on their environmental concerns. These stakeholders were considered to be representative of the community living in the area, the facility users and the business associated with the Vakhsh River Basin I&D system.

317. ALRI (and safeguard consultants) met several times with local government and relevant jamoat staff, community leaders, WUA representatives, local farmers, and residents who will be concerned with implementation and / or will benefit from the proposed project. Stakeholders' views were generally found to be very positive and supportive. A summary of consultations is provided in

318. **Table IV-1**. Further consultations will take place during the detailed design stage and implementation.

Table VI-1. Summary of Stakeholder Consultations

No	Dates	Summary of Stakeholders Consultations
1	Nov - Dec 2020	**Baseline survey**. The baseline (agro-socio-economic) survey included data collection from interviews with 330 farmers, mostly members of the Water Users Associations, in the Yovon scheme. The survey included asking respondents their priorities for improvement and modernization works.
2	Apr and Jun 2020 and Apr 2021	**Environmental Assessments.** As part of environmental assessments and IEE preparation, information about the project was disclosed and consultations held as follows: - April 2020: Consultations with Deputy Director of ALRI, Head of the Department of Land Reclamation and Irrigation in the Khatlon Region, heads of ALRI SALRI at district level and the District Environmental Protection Departments (DEPD) in project districts - June 2020: Consultations with: o Chairman of the Hukumat of Yovon district o Head of the Department of Environmental Protection of the Yovon District o Chief Engineer of LRID, Yovon District o Head of WUA Support Department, Khuroson district o Head of the Statistical Office, Khuroson district o Officers of the Forestry Department, Khuroson region

No	Dates	Summary of Stakeholders Consultations
		○ Chief Specialist of the Environmental Protection Department - April 2021: Additional consultations with focus on pipe systems and disposal of asbestos cement pipes which need to be replaced with: ○ Specialist of the department of state control of the land use and protection and waste management ○ Head of the Monitoring and Environmental Policy Department ○ Karimov Muhamadkul, Republican Sanitary and Epidemiological Service (SES)
3	May 2020, Jun to Sep 2020, and Nov-Dec 2020	**Buried Pipe Systems.** As part of field surveys and inspections, farmers were consulted about condition and works required for modernization of I&D (pipe) systems in the following 4 WUAs: - WUA Chorgul - WUA Norin - WUA Istiqlol 2010 - WUA Shabnam
4	Sep-Oct 2020	**Social Safeguards Due Diligence (Resettlement)** As part of social safeguards (resettlement) meetings held with: - responsible employees of land management and land reclamation departments, - representatives of WUAs in pilot districts Three public community consultations were held: - In Yovon district, Gulsara Yusupova jamoat, (ii) in A. Jomi district, Dusti jamoat, and (iii) in Khuroson district, Hiloli jamoat. - In total 105 people were consulted including local government and other relevant jamoat staff, community leaders, WUA representatives, local farmers, and residents. The consultations focused on the main system works (right branch canal and associated structures and two pumping stations). These works are all on public land. Issues relate to maintaining irrigation supplies and informing communities of change to schedules, traffic diversion measures at working sites, etc. Tertiary (on-farm) works were not discussed.
5	24 to 26 April 2021	Additional meetings were held with: - Head of the Tajik reclamation expedition in Yovon district, Saitov E. - Director of WUA "Chorgul-2012", Nodirov B. - Director of WUA "Norin" - Khudoikulov B. - Director of WUA "Obi Yovon" -Hudoyberdiev B - Director of WUA "Istiklol-2010" -Eshkuvatov F. - Representatives of dekhkan farms, farmers and jamoats in these WUAs These additional consultations concerning I&D pipe systems for the core area of 9,827 ha to be modernized, i.e., command areas of WUAs Chorgul-2012, Norin, Obi Yovon and Istiklol-2010. Crop compensations were discussed for temporary loss of land for work on pipe systems. Numbers of homestead courtyards/ buildings that could be affected were also estimated.

LRID = ALRI's district Land Reclamation and Irrigation Division

319. Grievances and appeals receiving focal points were identified in the jamoats of local government, who will receive, file, and process any grievances and issues received.

320. The first phase of disclosure and consultation took place in April 2020 with stakeholders including the Deputy Director of ALRI, Head of the Department of Land Reclamation and Irrigation in the Khatlon Region, heads of ALRI at the district level. The District Environmental Protection Department (DEPD) that covers the districts affected in the Yovon area were also contacted in April 2021. The disclosure and consultation involved professionals who have knowledge of relevant environmental disciplines and the engineering and commercial aspects of the Project. DEPD are important inclusions

because they are the agency responsible for reviewing the environmental reports.

321. The consultations offered the opportunity to collect available information on environmental parameters and facilitate consultations to identify the parameters for baseline environmental monitoring. During the consultations, guidance was obtained on various aspects of the environmental study. Emphasis was placed on the need to carefully choose the study area for impact analysis, consider climate change in project design, preserve wildlife and ecological assets, and assess impact of future traffic on Project areas. Management in handling and disposal of construction materials and excess gravels and sediments to designated sites was also emphasized and this is to be determined by the district administration. The participants and photographs are in **Annex 2**.

322. In April 2021, consultations were held with representatives of the State CEP under the President of the Republic of Tajikistan, as well as with representatives of the State Sanitary Service of Dushanbe and the Yovon District on issues related to procedures for the removal and disposal of asbestos-containing waste. The following information was received:

- The CEP's main responsibility is to develop waste management policies, strategies and legislations. The Committee is also responsible for the functioning of the entire structure at the national level, the implementation of the provisions of international agreements and conventions on environmental protection, as well as for monitoring of the environment. The /cep is also responsible for developing rules and standards for waste management activities.
- The Ministry of Health and Social Protection of the Population is responsible for monitoring of compliance with sanitary and hygienic standards in the implementation of waste collection and disposal activities. These cases are handled by a division of the Ministry of Health – the Sanitary and Epidemiological Service (SES).
- There are no special landfills for the disposal of asbestos-containing waste in Tajikistan. The concept of hazardous waste is incorporated in legislation relative to radioactive waste and pesticides. At present there is no methodology for the management of hazardous waste. Therefore CEP will be consulted to identify the most appropriate disposal site near the project.
- According to the current practice, asbestos-containing waste is transferred for temporary storage or disposal at district or city landfills.
- Before removing and disposing of asbestos-containing waste, a permit will be obtained for the removal, temporary placement, or disposal of ACM in the district department of the CEP (in this case, in Yovon department of the CEP). And also notify the Yovon SES unit.
- A contract for the removal, temporary placement, or disposal of ACM must be concluded with the administration of the Yovon district landfill. After determining the volume of ACM, a place for temporary placement of ACM will be identified at Yovon landfill, or a pit will be dug for their disposal. The cost of disposal of ACM will depend on the amount of asbestos-containing waste.

323. **Table VI-2** summarizes the questions and concerns raised during the consultations and responses provided by the representative of ALRI. The comments relevant to environmental issue were reflected on the EMMP.

Table VI-2. Summary of questions and concerns raised during the consultations

Question/Concern	Person raising the question/concern	Response provided by ALRI
What are impacts of the Project on nearby landscapes, habitats and the associated mitigation, minimization, prevention of any adverse impacts?	Sharipov Ibodullo, Head of the Department of Environmental Protection of the Yovon District	The project mainly aims to rehabilitate and upgrade existing irrigations systems, with replacement of outdated equipment at existing pump stations. Activities will take place entirely within the Vakhsh River Basin I&D system or within areas already subjected to partial clearing in the past. There will be limited and minor, if any, impacts on the remaining disturbed habitat, flora or fauna. Construction work will directly cause minor degradation of local ecology through the clearance of small areas of sparse vegetation at work sites and material stockpiling areas if required. Construction activities will impact only the areas within the Vakhsh River Basin I&D system. There is no vegetation in the Vakhsh River Basin I&D system area that has any conservation significance nor is it representative of the original vegetative cover which has degraded due to the effects erosion and desertification. There are no gardens, plantations and no individual trees that might require removal although gardens, homesteads and plantations are a feature of the surrounding area. The species present in the Project area are non-endemic, common and have no special characteristics to merit protection. However, replanting with grasses and shrubs will assist in surface stabilization to reduce dust as a form of enhancement. These items are in details considered in presented IEE and relevant mitigations measures are developed in form of EMP for each phase of the project (construction, operation). The contractor will also prepare a Site-Specific Environmental Management Plan to prevent and mitigate any environmental impact on time for the commencement of construction work and will follow its measures.
The Project should contribute to the comprehensive improvement of the I&D network, WUA organizational structure, mechanisms, systems, plans and capacities for environmental, social, health and safety management, including enforcement mechanisms and monitoring systems. Associated institutional	Nabiev Askarbek Ashurovich: First Deputy Chairman of the Hukumat of Yovon district, Nabiev Askarbek Ashurovich	The outputs/components of the project includes capacity building for different project stakeholders, including trainings on socio-environmental issues. The developed IEE and the EMP includes monitoring plans with the relevant responsibilities of involved parties and also proposed budget for recommended environmental activities and environmental staff. The contractor will also prepare a Site-Specific Environmental Management Plan (SSEMP) with the training program for their

Question/Concern	Person raising the question/concern	Response provided by ALRI
strengthening must be supported by adequate budget and human resources.		personnel and monitoring program on the basis of the IEE/EMP.
An adequate set of environmental plans and associated plans should be developed or clearly identify details. All these plans must be clearly linked to construction and supervision contracts.	Juraev Abdusalim Shoevich - Head of the Monitoring and Environmental Policy Department, State CEP	The IEE requires site-specific environmental plans (SSEMP) to be developed by Contractor. This requirement will be included in the bidding documents and then in the contracts with Contractors.
Quarries and disposal areas are the main environmental concerns associated with the upgrading of canals and asbestos-cement pipes. Comprehensive mitigation and remediation measures should be identified.	Juraev Abdusalim Shoevich - Head of the Monitoring and Environmental Policy Department, State CEP	The IEE proposes mitigation measures for proper waste management, including asbestos waste management. SSEMP will be prepared based on the IEE before the civil works commencement and provide detailed information of disposal sites for the waste.
Comprehensive environmental quality monitoring standards should be applied, including international best practices.	Juraev Abdusalim Shoevich - Head of the Monitoring and Environmental Policy Department, State CEP	Environmental impact monitoring (measurement of air quality, noise level, vibration, surface/ground water quality, etc. by accredited laboratory) will be conducted in response to complaints or as required by environmental authorities.[55] The result will be assessed in reference to relevant international standards as well as national standards.
Needed within the project to acquire provided special machines for flushing drainage pipes under water pressure, so they could check on which areas there is a problem and the possibility of replacing the failed pipes in this area.	Sangov Yormahmad - Chief Engineer of ALRI's district Land Reclamation and Irrigation Division (LRID), Yovon District	The project provides for the purchase of a pipe jetting machine for the WUA for washing out the drainage pipes. Failed pipes will be replaced where necessary. The environmental considerations will be taken into account for the technical design solutions – it is also mentioned in IEE/EMP. The best practices from the technical aspects will be additionally considered by ALRI/PIU.
In all public consultations, the main points of inquiry and discussion included: (i) physical works to be implemented, (ii) the expected start date for the project, and (iii) the GRM.	During an official public consultation September - October 2020 in Yovon, A. Jami and Khuroson districts.	ALRI explained the scope of the Project and the Project GRM. The project's civil works are expected to start in 2022. Preparation procedures and feasibility study of the project take time, but stakeholders will be informed in advance of construction work.
Representatives of local authorities in project districts suggested solutions and measures that would minimize adverse impact on beneficiaries. Examples included: (i) informing communities of the nature of	During an official public consultation September - October 2020 in Yovon, A. Jami and Khuroson districts.	On (i) and (ii); Preparation procedures Feasibility study of the project take time, but stakeholders will be informed in advance of construction work. On (iii) and (iv); Suggested diversion measures are already incorporated in the EMP.

[55] Monitoring required by environmental authorities will be determined through the SEE procedure (Chapter I.A.4.b).

Question/Concern	Person raising the question/concern	Response provided by ALRI
the works, (ii) informing about any impact on irrigation supplies – timing and volume, (iii) diversion measures, (iv) access to the works sites, and so on.		
Under the project, the contractors will be required to maintain irrigation supplies in the main vegetative season, not to hinder road access between communities and to farms, and to minimize any negative impacts on lands, properties, and crops.	During an official public consultation September - October 2020 in Yovon, A. Jami and Khuroson districts.	Prior to excavations, the necessary information and interaction with the local community will take place. Compensation for the disturbance will be paid before the works commence. The works will be scheduled to minimize the disturbance on agricultural activities as much as possible. The contractor will prepare a schedule of operations that will be approved by village chiefs and PIG / PIC. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used.

B. Information Disclosure

324. The principles of ADB SPS and national laws on land acquisition and resettlement requirements, as well as works and activities under the proposed project were disclosed in public consultations. Stakeholders were informed that they have the right to express their propositions, grievances, and issues, seek solutions and report on alleged violations of the adopted policies during implementation of the project.

C. Planned information disclosures

325. This IEE report will be disclosed on ADB website. ALRI will translate the summary of this IEE into Tajik and Russian languages and post them on ALRI website (footnote 8), within two weeks after ADB's clearance of the document. The information will also be made available at the district offices of the CEP and ALRI.

326. The PIG will prepare semi-annual environmental monitoring reports (SAEMRs) until ADB's Project Completion Report (PCR) is issued. The PIG will submit the SAEMRs to ALRI and ADB for disclosure, within 30 days after a completion of the monitoring period. Within three months after completion of all civil works, a report on the project's environmental compliance performance (including lessons learned that may help ALRI and the PIG in their environmental monitoring of future projects) will also be prepared. This report will be part of the input to the overall PCR.

327. The PIG will be responsible for notifying and informing the public of construction work prior to construction work, publishing an emergency response plan disclosing its intentions to deal with accidents and emergencies, including environmental / public health emergencies related to spills hazardous materials and similar events, etc.

VII. Environmental Management plan

A. Overview of Environmental Management Plan (EMP)

328. The EMP contains several components crucial to effective environmental management within the project. These include: (i) organizational responsibilities (for various aspects of EMP implementation); (ii) consultation and information disclosure; (iii) plan for mitigation of impacts (during pre-construction, construction, and operation); and (iv) monitoring and reporting.

329. The IEE has been prepared to identify and assess environmental impacts and has also set out a range of measures to avoid and/or mitigate those impacts. An SSEMP (including AMP) will be prepared by the contractor and submitted to ALRI/PIG for review and approval prior to commencement of works. **Table VII-4** is a matrix of mitigation measures and monitoring with responsibilities for implementation. Parts of the EMP such as the pre-construction and construction elements - will be used following completion of detailed design, as the basis for the environmental requirements of the contract and subsequently in the contractor's SSEMP. Most of the mitigation measures will be the responsibility of the contractor who will be required to identify the best means for mitigating an impact and include these in the SSEMP, therefore these costs will be borne by the contractor as part of the construction cost (included in contract).

B. Institutional Arrangements and Responsibilities

330. The Project will be implemented from January 2022 to June 2027. The ALRI will be the executing agency and the existing PIG[56] will be implementation agency. ALRI will be responsible overall for (i) overseeing the services of the PIG for the day-to-day project implementation, and (ii) will sign all contracts with consultants and contractors employed by the Project. The PIG tasks will include the procurement, accounting, monitoring, and supervision of the project, as well as the necessary liaison with ALRI, contractors, suppliers, and ADB. The ALRI/PIG will also be responsible for compliance with grant covenants. The day-to-day implementation and construction supervision will be carried out by two Project Implementation Units (PIUs) set up in field offices within the scheme area.

331. Project Implementation Consultant (PIC) services will be engaged to support the PIG in project implementation, providing services: (i) for detailed design and bidding document preparation for infrastructure works, and quality control of works (ii) preparation of detailed ToR, procurement documents, and training material, and supervision of NGO(s) engaged for the institutional, gender and agricultural components of the Project, (iii) implementation of environmental, social and resettlement safeguards, and (iv) project monitoring and reporting.

332. The Project Steering Committee (PSC) established for the Pyanj River Basin Project (footnote 56) will continue to provide oversight and coordination with other agencies. The PSC will continue to be chaired by the Deputy Prime Minister. The members include: Director of ALRI, deputy ministers of the Ministry of Finance, Ministry of Foreign Affairs, Ministry of Economic Development and Trade, Ministry of Energy and Water Resources (MEWR), Ministry of Agriculture, Chairman of Committee for State Investment and State Property Management, Committee for Women and Family Affairs, and CEP. The Committee meetings are held upon request to provide ALRI with strategic and policy guidance on project implementation. The implementation arrangements are summarized in **Table VII-1**.

[56] Established under ALRI and responsible for the implementation of the ongoing ADB-financed Water Resources Management in the Pyanj River Basin Project (47181-002) including Additional Financing (47181-004). See footnote 7.

Table VII-1. Indicative Implementation Arrangements

Aspects	Arrangements
Implementation period	January 2022 - June 2027
Estimated completion date	June 2027
Estimated grant closing date	December 2027
Management	
(i) Overseeing Body	Project steering committee comprising: Deputy Prime Minister (chair) Director of ALRI; chairs of the CEP, Committee for Woman and Family Affairs; deputy ministers of the ministries of agriculture, economic development and trade, energy and water resources, and finance (members)
(ii) Executing agency	ALRI
(iii) Implementing agency	PIG
(iv) Implementation unit	Dushanbe, staff 25

ALRI = Agency for Land Reclamation and Irrigation, CEP = Committee for Environmental Protection, PIG = Project Implementation Group

333. The environmental management structure and roles and responsibilities of various agencies and activities that will be undertaken are defined below. The institutional strengthening activities that will be required to allow those organizations to fulfil their nominated roles and responsibilities are identified. The links of the roles and responsibilities between ALRI, PIG, PIC and contractor are shown in **Figure VII-1**.

1. Agency of Land Reclamation and Irrigation (ALRI)

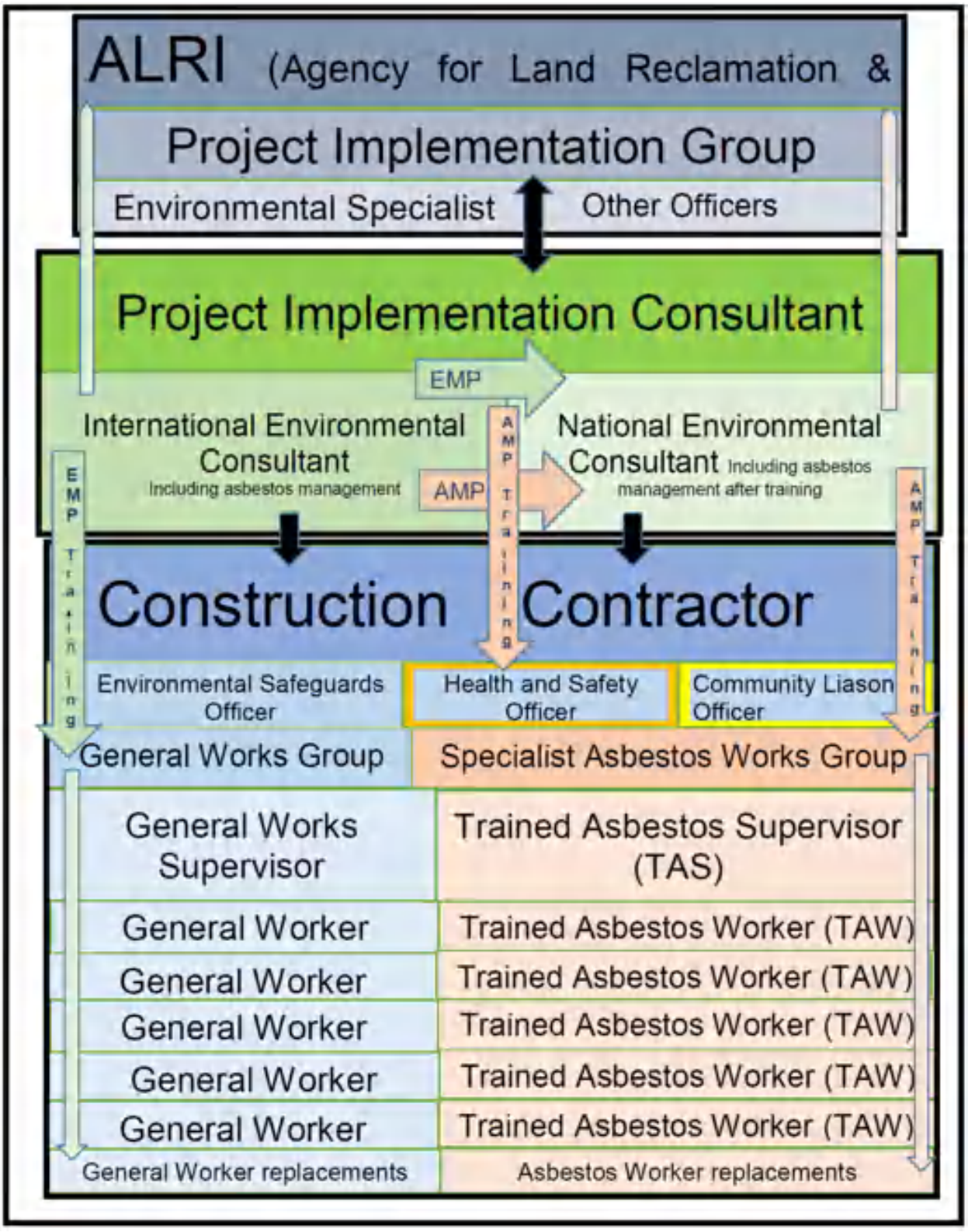
334. As executing agency for the Project, ALRI has overall responsibility for preparation, implementation and financing of environmental management and monitoring tasks for the Project and inter-agency coordination. ALRI will exercise its functions through the PIG which will be responsible for general project implementation and which will be tasked with day-to-day project management activities, as well as monitoring.

2. Project Implementation Group (PIG).

335. The PIG already established for ADB's ongoing Water Resources Management in Pyanj River Basin Project (footnote 7) will be augmented to implement the Project and manage detailed design and supervision of construction. PIG will be the implementing agency and is headed by a full-time Project Manager and supported by a team consisting of staff and consultants engaged under different project arrangements. Currently, the PIG has one environmental officer. The Project has evolved to the point that ALRI needs to identify or recruit additional staff. One additional full-time environmental officer (PIG-ES) will be engaged by ALRI/PIG for the duration of the Project implementation. This PIG-ES will receive training and capacity building from the international environment specialist (IES) and support environmental management and monitoring for the IDMVRB project.

336. The PIG will be responsible for the following: (i) assisting ALRI in implementing the Project; (ii) carrying out procurement and engaging PIC and contractors; (iii) as required liaising and coordinating with the CEP; and (iv) managing the contractors, and liaising with other stakeholders, on the day-to-day implementation of Project activities. ALRI, through the PIC, will retain experienced consultants - international environment specialist (IES) with special responsibility for asbestos management and a national environment specialist (NES) - to monitor and report on contractor's compliance with the EMP and the approved SSEMP.

Figure VII-1. Links between Environmental Management Roles



3. Project Implementation Consultant (PIC).

337. A consulting firm (PIC) will be hired to provide services for detailed engineering design, construction supervision, and other assignments, as needed. ALRI/PIG will be supported by a PIC. The PIC will comprise international and national specialists as required to supplement existing ALRI/PIG resources. In respect of safeguards, the PIC will include International Environmental Specialist (IES) with expertise in asbestos abatement and special responsibility for asbestos management, and National Environmental Specialist (NES) to be trained by the IES in asbestos abatement and asbestos management. Their scopes of works are described in the Project Administration Manual.

338. Capacity building programs and site-specific training in environmental and asbestos management will be delivered by the IES to staff in ALRI, PIG and to the NES. Contractors will also receive training and capacity support from the IES (including asbestos management) to ensure learning and development, as well as smooth and effective implementation of the SSEMP and AMP. Wherever possible it will be better for long term knowledge transfer if future projects - irrespective of financing - will provide support to engage staff in ALRI/PIG rather than national consultants brought on for specific projects. This will provide long term institutional support and develop ALRI/PIG.

4. Committee for Environmental Protection (CEP)

339. The CEP, the agency responsible for environmental management, was consulted at the outset of the IEE process and will be consulted on the confirmation of the categorization of the project under the country system. The CEP will, under the provisions of the Environmental Expertise Law (2012), review an EAR to be prepared by ALRI during the detailed design stage, and issue a positive result or conclusion from the SEE process in due course.

340. Ongoing consultation with CEP will be required during the construction of the project. The IES / NES and PIG will ensure that environmental management and mitigation of the project is undertaken to an acceptable standard. Periodic inspections will take place with CEP, ALRI/PIG, PIC and Contractors. The CEP will have access to participate in joint monitoring of implementation of the SSEMP if they require.

5. Contractor

341. The works Contractor will be responsible for responding fully to all contract conditions including those covering environmental mitigation, social mobilization and awareness and monitoring the contractor will then be responsible for implementing all environmental, health and safety actions included in the EMP and relevant clauses in the bidding documents and contract during the pre-construction and construction period.

342. The contractor will prepare the contractor's SSEMP based on the site-specific construction methodologies they propose to use and the EMP in this IEE and the AMP updated by the PIC IES. The SSEMP will further develop the EMP contained in this IEE and will detail measures for all impacts covered in the EMP including but not limited to traffic management, waste management, hazardous material and waste management and health and safety and AMP. ALRI/PIG will review and approve the SSEMP before the commencement of construction.

343. The contractor will appoint on Environmental Safeguards Officer (ESO) and Health and Safety Officer (HSO) who will be responsible for site inspections on a daily and weekly basis to check compliance with the approved SSEMP and ensuring implementation of all environmental, health and safety requirements. These will be documented and subject to monitoring by ALRI and PIG. The contractor will also appoint a Community Liaison Officer (CLO). The responsibilities of the Contractor include:

- Participating in induction on EMP and AMP to be delivered by PIC IES prior to preparation of the SSEMP;

- Appointing an ESO, HSO and CLO and sending letter to PIC and ALRI/PIG confirming that these positions have been filled and by whom before construction commences (the bidding documents and contract will specify the roles and tasks of the ESO, HSO and the CLO);
- Engaging in training and support from PIG / PIC on any aspects of environmental management, as required;
- Coordinating with PIG / PIC for preparing and submitting the SSEMP following detailed design, the ESO and the HSO will be responsible for ensuring that the Contractor complies with the clauses in the contract and bidding documents in respect of environment, health, and safety;
- As required, preparing, and submitting for approval, appropriate plans (tree cutting if necessary,[57] aggregate extraction, traffic management etc.);
- Engaging an approved service provider to undertake STIs and HIV/AIDS and COVID-19 briefings and awareness raising amongst the contractor's employees and communities, and reporting on the same;
- Coordinating with PIG / PIC in respect of community consultation i.e., establishing GRM etc.; and
- Undertaking daily and weekly site inspections (by the ESO and the HSO) recording the same in a site diary and participating in monitoring and coordinating with ALRI/PIG to ensure that environmental management activities are reported in Monthly Progress Reports as required.

344. The Contractor will appoint one capable and experienced person to receive training and become the TAS who will be responsible for asbestos work site set up and implementation of asbestos abatement on a daily and weekly basis to check compliance with the approved AMP and ensuring implementation of all health and safety requirements. The asbestos abatement will be documented by the TAS and assisted by the ESO and subject to monitoring by ALRI and PIG/PIC. The TAS will be trained by the IES with at least 5 capable and experienced persons to perform tasks as TAWs who will support the TAS in the implementation of the AMP. The TAS and TAWs will be appointed in the early stages of mobilization to facilitate training by the IES. The Contractor will send a letter to ALRI/PIG confirming that these positions have been filled and by whom before mobilization is complete so that the necessary training can take place in a timely manner. The responsibilities of the TAS under the Contractor include:

- Participate in training on asbestos management and AMP mitigation measures to be delivered by IES prior to preparation of the SSEMP including AMP;
- Working closely with all 5 TAWs and IES during the training to ensure good knowledge transfer;
- Supervising at least 5 TAWs on a daily basis for asbestos abatement work;
- Coordinating with PIC (IES and NES) for preparing and submitting the SSEMP including asbestos abatement methods following detailed design, the TAS will be responsible for ensuring that the Contractor complies with the clauses in the and bidding documents and contract in respect of asbestos management and safety;
- Seeking additional training and support from PIC on any aspects of asbestos management as required;
- Coordinating with Contactor and TAWs for the advance procurement of all materials and equipment required to implement the AMP correctly and adjust as necessary on site;
- As required, preparing, and submitting for approval, appropriate plans for in advance for asbestos management so that the necessary superior supervision and checking from PIG can be arranged;

[57] There are no gardens, plantations and no individual trees that might require removal although gardens, homesteads and plantations are a feature of the surrounding area.

- Undertaking daily and weekly site inspections, recording the same in a site diary and participating in monitoring and coordinating with ALRI/PIG to ensure that asbestos management activities are reported in Monthly Progress Reports as required.

345. The contractor will also appoint a Community Liaison Officer (CLO) who will be responsible for liaison and consultations on site and to discuss and inform affected communities in advance of work program in their areas.

346. The following table summarizes the different institutional responsibilities for EMP implementation for each package.

Table VII-2. Responsibilities for Environmental Management and Monitoring

Stage	Agency	Responsibilities
Design and preparation	Agency for Land Reclamation and Irrigation (ALRI)	- Overall responsibility for project management and operation - Ensure that sufficient funds are available to properly implement all agreed environmental safeguards, mitigation measures and asbestos abatement - Ensure that ALRI for the Project and other designated authorities for associated facilities have obtained necessary environmental clearances from CEP prior to award of civil works contracts - establish a grievance redress mechanism at the local and national level, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance; - Disclose the information of safeguards documents (including the project's IEE and SAEMRs, in both Tajik and Russian languages) on its website
	Committee on Environmental; Protection (CEP)	- Review and approve environmental assessment reports required by the GOT - Issue and renew environmental permits as required by the GOT/CEP during the project life - Undertake monitoring of the project's environmental performance based on their mandate
	Project Implementation Group (PIG)	- Appoint one more PIG-ES (in addition to the existing PIG-ESs) - Incorporate into the project design the environmental protection and mitigation measures identified in the EMP (including AMP) for the design stage including climate change adaptation measures included in the IEE; - Provide all necessary information to ALRI to facilitate obtaining environmental clearances from CEP prior to award of civil works contracts; - Notify ALRI of any change in areas or project design/components and provide all necessary information to ALRI to facilitate preparation of any additional environmental assessment prior to civil works commencement as required in the EMP (and AMP, e.g., preparation of new or supplementary environmental assessment in case of change in scope or location that will result to adverse environmental impacts that are not within the scope of the IEE prepared during the project processing, etc.); - Ensure that Project is designed to comply with GOT environmental laws and regulations; - Ensure that the AMP (including AIR, AAP and AOMP) is updated by the PIC based on the detailed design and included in the bidding and contract documents; - Ensure that bidding and contract documents for civil works include all environmental safeguards requirement; - During bidding ensure that contractor understands the required mitigation measures from the IEE and EMP are to be incorporated into the SSEMP document; - Ensure that environmental assessment is completed, and environmental clearance is obtained as required by CEP; - Ensure that the bidder selected will have adequate resources to implement and update EMP; - Review and clear contractor's SSEMP; and - Ensure that the SSEMP contains COVID-19 health and safety management plan following international good practice and relevant national/local requirements.
Construction	ALRI	- Overall responsibility for project management and operation - Ensure that sufficient funds are available to properly implement all agreed environmental safeguards, mitigation measures and asbestos abatement - Disclose the information of safeguards documents (including the project's IEE and SAEMRs, in both Tajik and Russian languages) on its website

Stage	Agency	Responsibilities
	PIG	- Undertake environmental management capacity building activities for ALRI/PIG/PIUs and orientation and awareness training for contractors and operators; - update the IEE in case of unanticipated impacts; - Conduct environmental monitoring and ensure that the day-to-day construction activities are carried out following the EMP and SSEMP (including the EMP) and in an environmentally-sound and sustainable manner; - prepare SAEMRs and submit to ALRI and ADB for disclosure, within 30 days after a completion of the monitoring period, until ADB's PCR is issued; - Based on the results of environmental monitoring, identify environmental corrective actions for submission to ALRI and ADB; - ensure corrective actions are implemented when necessary; - Report in a timely manner to ADB of any non-compliance or breach of ADB safeguard requirements; and - establish GRM, monitor and promptly address complaints, and ensure their effective and adequate resolution, and keep the relevant records.
	Project Implementation Consultant (PIC)	- Appoint IES (including asbestos management) and NES and provide training and capacity building on EMP and AMP to ALRI and PIG staff (including management) and provide training to engineers and contractors prior to the submission of contractor's SSEMP. - Incorporate into the project design the environmental protection and mitigation measures identified in the EMP for the design stage including asbestos management measures (AMP) included in the IEE. - During detailed design phase provide all necessary information to the ALRI to facilitate submission to CEP for SEE and obtaining environmental clearance from CEP prior to award of civil works contracts. - During detailed design notify PIG of the detailed design and any change in project design/components and provide all necessary information to the PIG to facilitate preparation of the bidding documents and any additional environmental assessment prior to project construction as required in the EMP (e.g., preparation of new or supplementary environmental assessment when location, scale and scope of works is defined) that will result in any adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.). - Update, based on detailed design, the AMP to be incorporated in bid and contract documents. - Assist PIG to undertake monitoring of the implementation of the EMP, AMP and SSEMP (mitigation and monitoring measures) including incorporating reports from the Contractor. - Assist PIG to prepare quarterly progress reports for ALRI and semi-annual safeguards monitoring reports for submission to ADB and ALRI as necessary including incorporation of reports from the Contractor the Contractor s and corrective action requests to contractor. - Based on the results of EMP and SSEMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to Asian Development Bank as necessary.
	Contractor	- Responsible for implementation of the EMP mitigation measures in the construction stage and will ensure sufficient human resources and budget for this purpose. - Appoint qualified ESO, HSO and CLO - Participate with ESO in induction training on EMP provisions and requirements delivered by the PIG and incorporate in the SSEMP. - Add site specific information in a timely manner to prepare the SSEMP and submit to PIG for approval. - Appoint TAS and TAWs to undergo asbestos training by the IES. - Ensure that all workers, site agents, including site supervisors and management, ESO, HSO and CLO participate in training sessions delivered by PIG. Maintain a record of training and conduct of awareness sessions for staff to ensure compliance with EMP and other applicable environmental and safety statutory and contractual obligations. - Ensure compliance with environmental statutory and contractual obligations and proper implementation of ADB requirements including approved EMP and SSEMP

Stage	Agency	Responsibilities
		- Based on the results of environmental monitoring, cooperate with the PIG and other authorities to implement environmental corrective actions and corrective action plans, as necessary.
Operation	ALRI	- Overall responsibility for project management and operation - Ensure that sufficient funds are available to properly implement all agreed environmental safeguards, mitigation measures and asbestos abatement - Disclose the information of safeguards documents (including the project's IEE and SAEMRs, in both Tajik and Russian languages) on its website
	WUA Management Authority (WUA/PIG)	- Overall responsibility for management of project construction and operation. - Ensure that sufficient funds are available to properly implement all agreed environmental safeguards mitigation and monitoring measures during operation. - Prepare SAEMRs and submit to ALRI and ADB; and - Based on the results of environmental monitoring including the one conducted by ISI/ISH or other agencies, ensure implementation of corrective action plans.
	District / Hukamat Administration	- Ensuring community wellbeing and hygiene living condition, controlling government utilities and preserving local cultural heritage resources. - Coordinate with community to provide human resources to support the project. - Assist in coordinating community concerns with regard to the implementation of the project.
	Committee on Environmental; Protection (CEP)	- Review and approve environmental assessment reports required by the GOT. - Issue and renew environmental licenses as required by the GOT during the life of the project. - Undertake monitoring of the project's environmental performance based on their mandate
	ISI and ISH	- Undertake monitoring of the project facilities and operations environmental performance, based on their mandate.

ALRI = Agency for Land Reclamation and Irrigation, AMP = Asbestos Management Plan, CEP = Committee on Environmental Protection, CLO = Community Liaison Officer, EMP = Environmental Management Plan, ESO = Environmental Safeguards Officer, GOT = Government of the Republic of Tajikistan, HSO = health and safety officer, ISH = Sanitary Inspectorate of the Ministry of Health, ISI = Industrial Safety Inspectorate, PCR = project completion report, PIC = Project Implementation Consultant, PIG = Project Implementation Group, PIG-ES = PIG's environmental specialist, SAEMR = semi-annual environmental monitoring report, SPS = Safeguard Policy Statement, SSEMP = Site Specific Environmental Management Plan, TAS = Trained Asbestos Supervisor, TAW = Trained Asbestos Worker, WUA = Water User Association

C. Assessment of Institutional Capacity

347. Capacity assessment of ALRI/PIG for application of environmental safeguards in donor assisted projects was carried out under another project. Environmental management for earlier donor assisted projects has been with support of consultants of ADB's ongoing Water Resources Management in Pyanj River Basin Project (footnote 7). ALRI has little direct experience in preparation of environmental assessment documents and the experience of the conformance to the national environmental requirements. CEP is still developing as the regulatory agency under the SEE. ALRI and CEP's approach to tackling environmental issues has been on a project level basis and varies with the requirements of the funding agency.

348. In Tajikistan, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of both the executing agency (ALRI) and the implementation agency (PIG) are still developing. ALRI/PIG has accumulated some experience on several other ongoing projects assisted by ADB, for investments in upgrading and improving the irrigation network.

349. The most significant challenge for environmental management on this Project is the limited human and financial resources and necessary infrastructure in ALRI/PIG as the line agency for implementation. The institutional capacity is in the existing ALRI/PIG created for implementation of ongoing development partner funded projects in the water sector. The appropriate agency to apply these objectives to handle environmental concerns for this project are the environmental specialists in ALRI/PIG who will be appointed during the term of this Project. Sufficient resources must be applied from ALRI/PIG to face the significant challenge for environmental management on this Project.

350. National minimum environmental standards have been declared and guidelines exist and need to be applied. However, the current capacities of ALRI/PIG to address the environmental issues at headquarters and regional offices are insufficient and have been augmented by the PIG for the Pyanj River Basin in ALRI; at present the staff currently deployed with direct responsibility for addressing environmental issues requires augmentation. At least one more PIG Environmental Specialist (PIG-ES) will be appointed for this project; delegated to check environmental matters on a regular basis "day to day" for environmental management of this project to be undertaken by ALRI.

351. Training and orientation programs on environmental aspects have been largely through the capacity building initiatives taken up as part projects, and these have been mostly one at a time and have been limited to awareness or sensitization workshops.

352. The capacity building to be carried out by the IES (including asbestos management) and NES from the PIC will include (a) awareness training of ALRI and PIG (including management) and contractors on environmental management as per GOT and ADB requirements; (b) capacity building programs to improve the capability of environment staff at all levels in carrying out monitoring and implementing environmental management measures; and (c) capacity building programs on environmental issues including pollution control and guidance on obtaining environmental licenses. The training programs will be extended to cover this Project and will be conducted in Dushanbe or as agreed with ALRI.

353. Contractor training workshops will be conducted periodically (especially if new workers are engaged) during the first year and every six months for the second and following years, to share experience in the implementation of the works and the monitoring report on the implementation of the EMP, to share lessons learned in the implementation and to decide on remedial actions, if unexpected environmental impacts occur. In the medium to long term as the environmental responsibilities of ALRI/PIG develop, dedicated staff officers including the PIG-ES will be trained and developed with the aim of taking over the role currently undertaken by consultants and specialists. Similarly refresher training for the AMP may be needed as the Project is rolled out.

354. The program for training of agencies for environmental management will commence in the detailed design and be continued with refresher training as necessary. It is assumed that 10 training sessions will be conducted at the commencement with refreshed training repeated 9 times at approximately six-monthly intervals during the construction programme. A target program for training is presented in **Table VII-3**. The training programme will be prepared with greater detail by the PIC during the detailed design.

Table VII-3. Target training program

Training	Trainer	Participants	Content	Times (min)	Period (day)	Num. of people	Budget ($)	Source of finance
ADB and GOT Laws, Rules, and Policies on Environment, Health, and Safety EMP implementation AMP Implementation	PIC (IES)	Regional departments, DA, ALRI/PIG, PIC, Contractors, APs	– ADB SPS – EMP, AMP and OHS – Project applicable environmental, health and safety laws, policies, standards and regulations – Impacts and mitigation measures during construction and operation – Monitoring and audit mechanism – Reporting requirements – Corrective actions for the EMP – Corrective actions for the AMP	10	1	10	15,000	Budget PIC
GRM	PIC (NES)	District departments DA, ALRI/PIG, WUA, FA, Contractors, APs	– GRM structure, responsibilities and deadlines – Types of Complaints and Conformity Assessment	5	1	20	10,000	
	Total						**25,000**	

ALRI: Agency for Land Reclamation and Irrigation; APs: Affected Persons; EMP: Environmental Management Plan; FA: Farmers Association; GOT: Government of Republic of Tajikistan; GRM: Grievance Redress Mechanism; PIC: Project Implementation Consultant; OHS: Occupational Health and Safety; PIC: Project Implementation Consultant: PIU: Project Implementation Group at district level; WUA: Water User Association; DA: Dehkan farm.

D. Environmental Monitoring and Reporting

355. ALRI/PIG will be responsible for monitoring the project construction activities; assisted by the PIC on a day-to-day basis. PIC NES will carry out regular daily and weekly inspections of construction activities and monitoring of mitigation measures. PIG-ES from ALRI/PIG will carry out spot checks to compliment the activities of PIC. Together this will provide an efficient use of the environmental monitoring resources available to the Project. The PIC NES will be trained by the IES to monitor the asbestos abatement work when the IES is not in the field.

356. Environmental monitoring is a very important aspect of environmental management during construction and operation stages of the project to safeguard the environment. In response to the impacts identified during the feasibility study, an EMMP (**Table VII-4**) has been developed. The contract documents will contain a list of all required mitigation measures in the EMP and a timeframe for the compliance monitoring of these activities. The monitoring will comprise surveillance to check that the contractor is meeting the provisions of the approved SSEMP and all other contractual obligations during construction. It is not considered necessary to conduct instrumented monitoring of noise, air, or water

quality at this stage (unless there are relevant issues/complaints raised) and regular ocular inspections will provide more information.

357. The ALRI/PIG-ES and PIC IES and NES will supervise and monitor the contractor's monitoring and implementation of mitigation measures during the construction stage and compliance with the SSEMP. ALRI / PIG during project implementation will be required to:

- Develop an environmental monitoring protocol for the construction period, and formulate a detailed plan;
- Conduct regular environmental monitoring, with assistance from the PIC, including review of daily and weekly site inspections undertaken by the contractor and items recorded in the ESO, the HSO and the TAS's site diaries (the main parameters to be monitored are outlined in the EMMP **Table VII-4** and the AMP in **Annex 1**); and
- Prepare environmental monitoring reports covering the above and prepare and submit inputs for the Quarterly Progress Reports.

358. PIG will, with PIC's assistance, prepare SAEMR summarizing progress on the monthly implementation of the EMP across the project activities and submit to ALRI, ADB, and to CEP if required.

359. During construction, the ESO, with the HSO and the TAS, is responsible for the preparation of environmental section of the contractor's monthly progress reports. The reports will comprehensively address all relevant aspects of environmental requirements and, in particular, all environmental audits undertaken during the period covered by the report. The monthly reports will be reviewed and endorsed by the contractor's project manager and then submitted to the PIC and PIG for review. Based on the contractor's monthly environmental reports, the PIC will support PIG in preparing SAEMRs. The PIG will submit the SAEMRs to ALRI and ADB for disclosure, within 30 days after a completion of the monitoring period. Within three months after completion of all civil works, a report on the project's environmental compliance performance (including lessons learned that may help ALRI and PIG in their environmental monitoring of future projects) will also be prepared. This report will be part of the input to the overall PCR. During operation, PIG will prepare SAEMRs with assistance of the PIC and submit to ADB and ALRI for disclosure, until ADB's PCR is issued. In case the PIC's liability period ends before ADB's PCR issuance, PIG itself will prepare the SAEMRs. PIG, with the support of the PIC, will translate the summary of these documents into both Tajik and Russian languages, and post them on ALRI website[58] with the full reports (in English), within two weeks after ADB's clearance of each document. In addition to the above-mentioned reports, in case of any accident related to occupational and community health and safety, the ALRI / PIG is expected to (i) report to ADB within 72 hours, and (ii) prepare and submit an incident report with action plan within 7 days of the occurrence.

360. Responsibilities for the implementation of the monitoring requirements of this IEE are shown in **Table VII-2** and the EMMP **Table VII-4**. Implementation of most mitigation measures during the construction stage will be the responsibility of the contractor in compliance with the bid documents, contract clauses and technical specifications.

[58] See footnote 10.

Table VII-4. Environmental Management and Monitoring Plan

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
PRE-CONSTRUCTION / DESIGN PHASE								
1	Climate change adaptation	Risk of increased erosion Risk of additional snowfall and rainfall	1. Ensure all sand stabilization and erosion protection measures such as bunds, planting, watering, establishing and maintaining vegetation are incorporated in design and are implemented. 2. Ensure ancillary structures are built to withstand additional snow loads and drains can accommodate additional rainfall.	ALRI / PIG – and PIC / contractor	Included in Contract of PIC	- Designs and works implemented	Check design specifications	ALRI / PIG Check
2	Detailed Design	Risk: Nature-based solution is not applied as part of the Project	3. Ensure nature-based solution is reflected on the detailed design, to stabilize and reclaim major gullies and buffer area.	ALRI / PIG – and PIC	Included in Contract of PIC	- Designs and works implemented	- Check detailed design and specifications	ALRI / PIG Check
3	Asbestos Investigation Report (AIR)	Risk of respiratory disease associated with occupational exposure to asbestos	4. Conduct asbestos investigation and prepare an AIR. 5. Analysis of samples by accredited laboratory. 6. Include findings in updated AMP.	PIC-IES	Included in Contract of PIC	- AIR before tendering Analysis of samples by accredited laboratory. - AIR incorporated in the updated AMP in contract specification	- Check contract specifications - Check capability of PIC before selection - Check proposed laboratory before mobilization	ALRI / PIG / PIC Check
4	Asbestos Management Plan (AMP)	Risk: Management and contractors are not aware of risks from ACM mismanagement.	7. Identify a suitable waste management facility for asbestos disposal in consultation with the CEP. 8. Conduct asbestos awareness for ALRI / PIG / PIC by reputable IES 9. Promulgate updated AMP 10. Incorporate AMP in EMP in contract specification	ALRI / PIG PIC-IES	Included in Contract of PIC	- AMP updated before tendering. - Updated AMP incorporate in EMP in all contract specifications	- Check contract specifications - Check capability of contractors before selection / Conduct awareness training before mobilization	ALRI / PIG / PIC Check
5	Bidding, contracting	Risk: EMP and other environmental safeguards requirement are not included in the contract therefore not implemented.	11. In the event that any design details change the locations or scope of the proposed Project works, and unanticipated environmental impacts become apparent, this IEE and EMP will be reviewed, revised/updated accordingly. The revised/updated IEE/EMP will be cleared by ADB prior to the civil works commencement. 12. Include EMP (including updated AMP) in bidding document and contracts with, PIC, contractors, engineering supervisors and environmental monitoring consultant. 13. Include EMMP in contracts.	ALRI / PIG – and PIC	Included in Contract of PIC	Designs and works implemented	Check design and specifications	ALRI / PIG Check

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
6	Staffing and budgeting for EMP	Risk: Contractors do not implement EMP if not required in contract	14. At least one month before construction commences the contractors and operators will demonstrate to the PIG, they are properly resourced and a qualified/experienced ESO, HSO, TAS, TAWs and CLO with appropriate experience will be identified by the contractors in bid.	PIG– and PIC / contractor	Included in Contract of Contractor	Suitable staff identified	Before contractors fully mobilize	ALRI / PIG /PIC Check
7	EMP training of contractors, engineers, workers and foremen on EMP	Risk: Contractors are unaware of or do not implement mitigation measures	15. Contractors informed of all environmental safeguard requirements in EMP at bid stage and trained how to implement mitigation measures (in EMP and AMP) and monitor and use of checklists as part of awareness and mobilization training; and assistance with SSEMP. 16. The contractor will identify a CLO to be the liaison with the local village authority and PIG as well as between the contractor and PIG; 17. At all times workers will respect landowner's boundaries; 18. Contractor informed to ensure that workers' actions outside work site are controlled and local village codes and rules of conduct are observed at all times; 19. Worker camp (if required) operations not to cause nuisances to local village and facilities will be located at least 500m (as far as possible) from settlements and agreed with local communities and approved by PIG and managed to minimize impacts; 20. Contractor informed to hire and train as many local workers as possible by using labor from each village as the work proceeds. 21. Adequate signage and security provided at the site offices and works yard and prevention of unauthorized people (especially children) entering the working areas; 22. Hire and train as many local workers as possible by using local labor;	PIG – and PIC Contractor (must attend)	Included in Contract of PIC	Awareness training completed	Before contractors fully mobilize	ALRI / PIG /PIC Check
8	Contractor's SSEMP prepared Awareness and orientation of Contractor	Risk that some foreseeable impacts are not captured in SSEMP.	23. Following induction training provided by the IES, NES, PIG-ES and PIC, the construction contractor will prepare SSEMP detailing how they propose to implement the construction works and operations and	PIC oversees and assists Contractor to compile SSEMP based on the EMP in the	Included in Contract of Contractor	SSEMP prepared and endorsed	Before contractor mobilizes review / inspection of SSEMP	ALRI /PIG Check

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			comply with the EMP. The SSEMP will include the contractors proposed actions to cover: (i) summary of construction impacts and mitigation; (ii) water supply for construction; (iii) connections to drainage, waste water arising (if any) and recycling and reuse of wastewater; (iv) inclusion of the requirements of the updated AMP stating the proposals for removal, handling, transportation and disposal of ACM as a minimum in line with this IEE; (v) solid waste management and disposal – including ACM and hazardous waste; (vi) noise, dust and odor suppression; (vii) utilities, power and telecommunications reprovisioning and commissioning (if necessary); (viii) temporary and permanent surface drainage; (ix) construction materials management; (x) excavation and rehabilitation of land including shoring plan; (xi) traffic management; (xii) worker and public safety including coronavirus diseases (COVID-19) health and safety management plan and emergency response plan; (xiii) vegetation removal, site cleanup and revegetation / amenity planting for amenity and bioengineering for erosion control; (xiv) construction camp management plan; and (xv) communications plan. The communications plan will indicate how the Contractor will interact and inform the community in advance of planned works and mitigation measures specified in the EMP (such as using a Community Liaison Officer [CLO]).	*IEE* and the SSEMP will be prepared by the Contractor assisted by PIC as necessary.				
9	PIG Check on legitimacy of material sources	Risk: The Project does not comply with local authority requirements and ADB requirements, and material suppliers are fit for purpose	24. PIG checks legitimacy of material supplies proposed by Contractor in the SSEMP	PIG / PIC Contractor	Included in Contract of PIC	SSEMP prepared and endorsed	Before contractors fully mobilized	ALRI /PIG
10	Surveying and demarcation	Risk of minor loss of vegetation during demarcation	25. Vegetation clearance will be minimized and replanting for erosion control will be encouraged / required; 26. The contractor /operator will be responsible for providing adequate	PIG / PIC Contractor	Included in Contract of PIC and Contractor	Area of vegetation; area of felled trees/vegetation removal	Before contractor mobilizes review / inspection of SSEMP	ALRI /PIG

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			knowledge to construction /operations workers in relation to existing laws and regulations regarding environmental requirements. 27. Construction / operations workers will be informed about general environmental protection and the need to avoid un-necessary environmental pollution and how to follow the environmental requirements.					
11	Site clearance an excavations	Risk of accidental damage on physical cultural resources or cultural property sites	28. Site agents will be instructed to keep a watching brief for relics / physical cultural resources in excavations. 29. Should any potential items be located, the PIG will immediately be contacted, and work will be temporarily stopped in that area. 30. The PIG / ALRI will determine if that item is of potential significance with the assistance of the local authorities and to pass the information to the relevant department in GOT who will be invited to inspect the site and work will be stopped to allow time for inspection.	Contractor	Included in Contract of Contractor	Sites and/or resources discovered and protected	During activities - stop work order issued; - site/resources dealt with appropriately	Contractor; PIC, PIG, ALRI, MOC
12a	Preparation for good health and safety procedures	Contractors do not pay attention to health and safety requirements creating risk to workers and public (especially children). Risk of accidents and injuries.	31. Predictable wastewater effluent discharges from construction and operational activities will have the necessary permits from PIG, CEP and local authorities before the works commence; 32. Provision of adequate protection to the general public in the vicinity of the site, including advance notice of commencement of works, installing safety barriers and signage or marking of the work areas;	Contractor	Included in Contract of Contractor	Conditions at camp, yard, streams/rivers nearby	Monthly observation, consultation	Contractor PIC and PIG check
12b	Preparations to protect health of community	Risk from spread of communicable diseases	33. Construction camp(s) will be established in areas with adequate drainage in order to prevent formation of breeding sites for mosquitoes; 34. Implement HIV/AIDS/STIs awareness and prevention for the contractor's workers and adjacent communities; 35. Construction camp(s) will be established in areas with adequate drainage in order to prevent water logging at the camp and formation of breeding sites for mosquitoes in order to facilitate flow of the treated effluents;	Contractor and Approved service provider	Included in Contract of Contractor	STI/HIV/AIDS prevalence Increased awareness about transmission and prevention	Prior to construction - consultation with employees, discussions with NGO	PIG/ PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			36. Implementation of HIV/AIDS awareness and prevention program – community (villages).					
			37. Collect baseline data of surface water quality (See para. 172)	PIC	$20,000 (Included in Contract of PIC)	Surface water quality baseline data collected (See para. 172)	Prior to civil works commencement.	PIG/PIC
12c	Preparations for COVID-19 protocol to protect workers and health of community	Spread of communicable diseases and COVID-19	38. Prepare and implement COVID-19 health and safety management plan and emergency response plan as part of the SSEMP. 39. The Client, engineers and contractor are required to form a covid-19 prevention task force. 40. Covid-19 prevention task force is responsible for socialization, education and COVID-19 prevention during the project implementation. 41. Install posters about the appeal or advice to prevent COVID-19, such as washing hands, wearing mask, installed in strategic places on the project site. 42. The task force together with medical staff must discuss, advise, campaign on COVID-19 prevention techniques in every socialization activity and morning counselling activity. 43. Medical personnel check every worker's temperature morning and evening. Prohibits someone who is sick with a temperature indication of ≥38 degrees Celsius came to the project site. 44. Assess workforce characteristics by identify the vulnerable group of COVID-19 including elderly people and those with underlying health issues. 45. Conducting virtual meeting if necessary and implementing physical distancing for direct meetings and field works. 46. Provision of PPE to prevent COVID-19, Make wearing a mask a normal part of being around other people. 47. Maintain physical distancing at least a 1-metre distance from each other to reduce risk of infection when cough, sneeze or speak. Maintain social distancing by	Contractor and Approved service provider	Included in Contract of Contractor	Increased awareness about COVID-19 transmission and prevention	Prior to construction - check contractor records, consultation with employees, discussions with NGO	PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			decreasing the size of work teams and limiting the number of workers not more than 10 persons on site at any one time. 48. Continuing with the usual environmental and social management trainings, adding self-hygiene and COVID-19 related training as appropriate. 49. Assess the extent to which work schedule needs to be adjusted (or stopped) to reflect prudent work practices, potential exposure of both workers and the community and availability of supplies, taking into account Government advice and instruction. 50. If found workers or employees in the project field who are exposed to COVID-19, the task force will immediately contact the GOT covid-19 prevention task force to carry out emergency evacuation to the exposed worker and the group s/he was working with for further treatment. The task force is then conduct spraying disinfectants on sites, facilities, handles, work equipment in the exposure location. The listed workers will not be allowed to remobilize to the site without proven free Covid-19 health certificate. 51. The community will make aware of all measure being implemented to limit contact between workers and the community, procedure for entry/exit to the site, the training being given to workers and the procedures that will be followed by the project if a worker become sick.				
CONSTRUCTION PHASE								
1	Establishment of construction camp, mobilization of contractor, presence of construction workers, associations with local people	Risk of social disruption	52. Covered under Preconstruction Phase above. 53. Construction camp management plan will be prepared in reference to World Bank Group's Workers' Accommodation: Processes and Standards, [59] as part of SSEMP and implemented.	Contractor	Included in Contract of Contractor	Complaints of incidents between workers and villagers; No. of children entering camp; Number and effectiveness of signs	During activities - checking records for complaints - consultation with workers about protocols	PIG / PIC

[59] A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards (ifc.org) (August 2009)

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			54. Village protocols discussed with workers as part of awareness and mobilization training; 55. The contractor / operator is to ensure that workers' actions outside the Project site are controlled and Village codes and rules of conduct are observed at all times; 56. The contractor will identify a CLO; 57. Worker camp location and facilities will be located as far as possible and at least 500m from settlements and agreed with local communities and facilities approved by PIG / PIC and managed to minimize impacts; 58. Adequate signage and security provided at the site offices and works yard and prevention of unauthorized people (especially children) entering the working areas; 59. Hire and train as many local workers as possible by using labor from local village as the work proceeds;					
		Risks to worker health and safety	60. Provide adequate housing for all workers at the construction camps and operator factories and establish clean canteen/eating and cooking areas; 61. Construction camp(s) will be established in areas with adequate drainage and be connected to the local foul water disposal system or, if such system is not available, septic tank (to be provided by the contractor) to facilitate disposal of effluents; 62. Wastewater effluent from contractors' workshops and equipment washing yards will be passed through gravel/sand beds and all oil/grease contaminants will be removed before discharging it into the environment. Oil and grease residues will be stored in drums awaiting disposal in line with the agreed waste management section of the EMP; 63. Predictable wastewater effluent discharges from construction and operational activities will have the necessary permits from PIG, CEP and local authorities before the works commence;	Contractor	Included in Contract of Contractor	Camp, yard, streams/rivers	Monthly observation, consultation	Contractor PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			64. Potable water, clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided. Separate toilets will be provided for male and female workers; 65. Drinking water and clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided. Separate toilets and washrooms will be provided for male and female workers; 66. Portable lavatories (or at least pit latrines in remote areas) will be installed as temporary measure where necessary and open defecation will be prohibited and use of lavatories encouraged by cleaning lavatories daily and by keeping lavatory facilities clean at all times; 67. Solid and liquid wastes will be managed in line with the provisions of the waste management section of the EMP and subsequently SSEMP; 68. Provision of safe access across the works site (particularly during any excavations) to people whose village and access are temporarily affected during construction works; 69. Land used for campsites will be restored to the original condition as far as practicable and the area will be planted with appropriate grasses / shrubs as soon as practicable after it is vacated and cleaned; and 70. Work and camp sites will be cleaned up to the satisfaction of and PIG / PIC and local authority after use. 71. At all times workers will respect village and landowner's boundaries and recognize and follow village rules and terms of conduct, including those addressing women and elders.					
2	Construction plant and vehicles generating emissions	Risks of excessive emission of exhaust from vehicles and machinery;	72. Construction and operational equipment being maintained to a good standard. The equipment will be checked at regular intervals to ensure they are	Contractor	Included in Contract of Contractor	Air quality, emissions, dust, particulate matter;	Monthly or after complaint - periodic visual inspection;	Contractor; PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
		dust from aggregate crushing plant; generated by heavy vehicles transporting materials on roads; uncovered loads on trucks; and dust from exposed stockpiles	maintained in working order and the checks will be recorded by the contractor / operator as part of environmental monitoring; 73. Prohibition of use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at the project site; 74. Ensuring that all vehicles transporting potentially dust-producing material through built up areas are not overloaded, are provided with adequate tailboards and sideboards, and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle) during transportation. This is especially important if the transportation will travel through adjacent villages nearby; and 75. Qualitative air quality monitoring by observation and quantitative air quality monitoring (PM10 and PM2.5) in response to complaints or as required by environmental authorities.[60]			Use of tarpaulins and loading of vehicles; Stockpiles	Any particulate matter and smoke managed as per EMP Result of qualitative and quantitative air quality monitoring	
3	Operation of construction plant and equipment creating noise	Risk of nuisances and creating excessive noise in community; and noise impacts on construction workers	76. The EMP and contract documents will require that all vehicle exhaust systems and noise generating equipment be acoustically insulated and maintained in good working order and that regular equipment maintenance will be undertaken to minimize noise emissions; 77. Aggregate processing, if necessary, will be undertaken at a designated site located at least 500m away from the nearest sensitive receptors. 78. The works will be scheduled to minimize the disturbance on agricultural activities as much as possible. The contractor will prepare a schedule of operations that will be approved by village chiefs and PIG / PIC. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used; 79. Workers will be provided with ear defenders as may be required; and	Contractor	Included in Contract of Contractor	Adherence to agreed schedule; Complaints (numbers logged with resolution); Workers have required safety equipment.	Monthly or after complaint - review schedule Consultation (ensure schedule being adhered to) GRM register	Contractor keeps records; PIG / PIC check

[60] Monitoring required by environmental authorities will be determined through the SEE procedure (Chapter I.A.4.b).

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			80. Any complaints regarding noise will be dealt with by the contractor in the first instance through the communications plan and if unresolved they will refer through the grievance redress mechanism (GRM). 81. Any complaints regarding noise will be dealt with by the contractor in the first instance and through the GRM. 82. Background and impact noise will be measured in response to complaints or as required by environmental authorities[61] in dB(A) over 24 hours covering the relevant periods (i.e., 6h to 18h, 18h to 22h and 2h to 6h). Measurement will also be taken to establish if EHS guidelines[62] are exceeded.					
4	Excavations for installation of I&D facilities or foundations for installations and building works.	Uncontrolled stockpiling and disposal of excavated materials risks giving rise to dust and nuisances and lack of shoring or incorrect propping up of trenches leads to ground instabilities and landslip.	83. Prior to excavations, the necessary information and interaction with the local community will take place. Compensation will be paid before the works commence. 84. Prior to excavations, prepare all materials on site to complete the shoring of excavations; 85. Follow the principles for trench safety developed by the PIC for work in difficult soils and implement the shoring plan approved by the PIC and included in the SSEMP; 86. Provide shoring for deep trenches (>1.2m or greater unless the excavation is made entirely in stable rock); 87. Provide safe means of access and egress from trench excavations; 88. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.2m) or more in depth so as to require no more than 25 feet (8m) of lateral travel for employees [If possible, the grade should be away from the excavation]; 89. PIG-ES to inspect and approve the shoring (in writing) if it is properly constructed;	Contractor	Included in Contract of Contractor	Excavation controlled Use of backhoes etc. for compaction Stability of stockpiles. Use of tarpaulins to restrict runoff.	Monthly or after complaint - periodic visual inspection; Any particulate matter and slippage as per EMP	PIG / PIC

[61] Monitoring required by environmental authorities will be determined through the SEE procedure (Chapter I.A.4.b).
[62] See footnote 10.

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			90. Carefully stockpile excavated materials in a location where they cannot slip or be washed back into the trench; 91. Carefully stockpile and reuse of any surplus soil or subsoil as covering or fill for other project works and planting; 92. Reuse excavated materials for backfill as far as practicable; 93. Level and compact fill materials. Prevent erosion / slippage; 94. Material stockpiles to be located in sheltered areas and to be covered with tarpaulins or other such suitable covering to prevent material becoming airborne and runoff of fine particles.					
5	Construction work requiring water supply	Demands on local water supplies tapped to meet campsite and construction requirements, bringing project-based water use in competition with local use; Water is not used carefully or is wasted. Water conservation is not practiced.	95. Prior to construction the SSEMP will include a water use and conservation plan identifying and quantifying planned water use, water reuse options and possible end uses for watering vegetation etc.; 96. Abstraction from water resources will be permitted after prior approval from PIG in consultation with local village leaders and local water authorities. 97. Contractors instructed not to waste water and PIG / PIC watch contractors ensure they do not waste water and water conservation measures are followed. 98. Design and construct to reduce the use of water flow and reduce the flow as far as practicable; 99. Create a workplace culture (including water patrols) that focuses and takes pride in water efficiency to add a beneficial component to water conservation plan;	Contractor	Included in Contract of Contractor	Water supply adequate and no wastage	Monthly or periodic visual inspection	PIG / PIC
6	Solid waste, all general activities requiring disposal of solid waste construction debris and spoil	Improper disposal of solid waste and liquid wastes Failure to identify waste management and likely to arise in advance including (i) expected types of waste and quantities of waste arising;	100. Solid Waste Management Plan as part of the SSEMP to include as follows: 101. Segregation of wastes will be observed. Cleared shrubs and grasses may be composted or used as mulch. Organics (biodegradables) will be collected and disposed-off on-site by composting; 102. Reuse and recycle on site as much as possible: so that the balance needing disposal be minimized;	Contractor	Included in Contract of Contractor	Solid waste controlled All waste to designated disposal areas No-illegal dumping (fly-tipping)	Monthly or after complaint - periodic visual inspection; as per EMP	PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
		(ii) waste reduction, reuse and recycling methods to be employed; (iii) agreed reuse and recycling options and locations for disposal / endorsement from CEP and local groups; (iv) methods for treatment and disposal of all solid and liquid wastes; (v) Methods of transport to minimize interference with normal traffic; and (vi) establishment of regular waste collection and disposal schedule	103. For temporary storage/piling: specify requirements e.g. distance from water bodies or settlements or other sensitive receptors, compacting ground with bund around to prevent/restrict spillage to water/farmland, etc. 104. Construction debris: is inert thus easiest to handle, can dispose of in properly selected wasteland approved by local authority or currently designated landfill site in Yovon; 105. residual general wastes or garbage will be disposed of in the local landfill disposal sites currently used for municipal wastes, approved by local authorities and PIG / PIC; 106. Burning of waste will not be allowed; 107. All areas of the Project will be provided with garbage bins which will be emptied regularly, and recyclables' extracted recovered and / passed to recyclers; 108. Disposal of solid wastes into canals, drains, streams, river habitats, places of worship or other culturally sensitive areas or areas where a livelihood is derived such as public areas will be strictly prohibited;					
7	Use of hazardous substances such as oils and lubricants and any toxic chemicals	- Uncontrolled or if hazardous waste not disposed correctly. - Oils and lubricants discharged to vegetated areas kill plants, are resistant to microbiological decay mechanisms and may remain hazardous for long periods. - Access to and use of hazardous substances is not controlled - Waste disposal is not designed for or appropriate to hazardous waste such as oils and lubricants. - Hazardous waste impacts from storage,	109. Ensure that safe storage of fuel, other hazardous substances and bulk materials are away from water bodies agreed by PIG / PIC, follow GOST regulations and have necessary approval/permit from CEP and local authorities. 110. Fuel and other hazardous substances will be stored in areas as a minimum provided with roof, sealed flooring and bund/containment wall to protect these from the extremes of weather and to readily contain spilled fuel/lubricant; 111. Hydrocarbon and toxic material will be stored in adequately protected sites consistent with national GOST and any local regulations to prevent soil and water contamination; 112. Equipment/vehicle maintenance and refueling areas will be confined to areas in construction and the Project sites designed to contain spilled lubricants and fuels. Such	Contractor	Included in Contract of Contractor	Hazardous waste collected and stockpiled	Monthly or after complaint - periodic visual inspection; as per EMP	PIG / PIC CEP check

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
		spillage and use of hazardous substances is not managed. - Hazardous waste disposal is not monitored or controlled to avoid or minimize impacts. - Expected types and volumes of hazardous materials and waste are not managed. - Appropriate Methods for handling and disposal of hazardous wastes are not used. - Approvals and environmental permits required for hazardous waste disposal not obtained. - Appropriate Methods of transportation and handling are not practiced; and - Establishment of regular disposal schedule is not practiced leading to accumulations of hazardous waste.	areas will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil (slimmings to be disposed of as hazardous waste) and maintained to ensure efficiency; 113. Hazardous wastes (oily wastes, used batteries, fuel drums) will be segregated and ensure that storage, transport, and disposal will not cause pollution and will be undertaken consistent with national and local regulations; 114. Ensure all storage containers are in good condition with proper labelling in English and Russian/Tajik; 115. Regularly check containers for leakage and undertake necessary repair or replacement; 116. Store hazardous materials above ground level away from water bodies in areas where melting snow or unseasonal heavy rain may cause flooding; 117. Discharge of oil contaminated water will be prohibited, and separated oil will be disposed of at designated oil disposal site or oil recycler; 118. Used oil and other residual toxic and hazardous materials will not be poured on the ground; 119. Used oil and other residual toxic and hazardous materials will be disposed of in a location / facility authorized by the CEP; 120. Adequate precautions will be taken to prevent oil / lubricant / hydrocarbon contamination from maintenance of mobile heavy and other mechanical equipment affecting soil such as by using drip trays; 121. Washing of project vehicles in next to storm drains and sewers or other field drains and canals is strictly prohibited; 122. Ensure availability of spill clean-up materials (e.g., absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances, near where such materials are being stored;					

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			123. Spillage, if any, will be immediately cleared with utmost caution using absorptive clean up materials to leave no traces; 124. Spillage waste will be disposed at disposal sites in a location / facility authorized by the CEP; 125. All areas intended for storage of hazardous materials will be segregated with appropriate signage and provided with adequate facilities to combat emergency situations complying with all the applicable statutory requirements and GASI regulations; 126. The contractors will identify named personnel in their SSEMP in-charge of storage sites for hazardous materials and ensure they are properly trained to control access to these areas and entry will be allowed only under authorization.					
8	Asbestos Management and Containing Material (ACM) Waste	ACM not managed according to updated AMP and contractors avoid using specified work practices in the AMP The AMP is an integral part of the IEE and EMP and is presented as a stand-alone document in line with best international practice in **Annex 1** to the IEE.	127. Undertake representative sampling from typical cement sections and other typical locations for ACM such as (i) water pumps; (ii) cement pipes serving inspection chambers and off-take gates; (iii) curved cement flumes and concrete channels. 128. Sign off that the Contractor and the requisite capable staff have read the AMP, understand the risks and will be able to follow all aspects of the AMP for the duration of the project. 129. Provide asbestos awareness training 130. Conduct refresher asbestos awareness training for all staff and include TAS and TAWs in any follow up training	PIC IES	Included in Contract of PIC	- Representative sampling undertaken - the Contractor and the requisite capable staff signed off on the relevant knowledge - asbestos awareness training (including refresher training) conducted	- Prior to the commencement of I&D civil works - Throughout the project implementation period	PIG / PIC
			131. Use of power tools to cut asbestos pipes must be prohibited. 132. Identify suitably capable staff to be TAS and TAWs to be exclusively trained employed for the specialist asbestos abatement work. 133. Ensure (the requisite capable staff) read the AMP and understand the risks. 134. Provide all necessary equipment in material in the AMP sufficient for removal of all ACM and provide inventory to PIG / PIC before works commence, as required.	Contractor;	Included in Contract of Contractor	- Sites and/or resources discovered, and the protection measures being put in place	During activities - stop work order issued; - Site/resources dealt with appropriately	PIG / PIC; MOC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			135. Follow all instructions and methods from asbestos awareness training by reputable qualified IES and follow all supplementary instruction from ALRI / PIG / PIC / PIC in line with the updated AMP. 136. Incorporate all AMP and updated AMP requirements in the SSEMP as per in contract specification 137. (All staff and include TAS and TAWs) to participate in refresher asbestos awareness training 138. Follow all requirements of the updated AMP and follow all supplementary instruction on locations and Methods of removal, handling, wrapping, transportation and disposal of ACM from CEP, ALRI / PIG / PIC in line with the updated AMP.					
		Asbestos waste disposal is not included as a condition of contract agreement	139. Ensure that safe storage of all wrapped packages of ACM waste 140. Obtain necessary approval/permit for disposal from CEP and local authorities. 141. Follow directions in the AMP for identification, work with asbestos, labeling, removal, handling, transportation and disposal of ACM waste. 142. Monitor all wrapped ACM waste packages from source to disposal (cradle to grave) following directions in AMP. 143. If unexpected ACM is identified, inform PIG / PIC. 144. No reuse of ACM pipework or other ACM to be permitted.	Contractor	Included in Contract of Contractor	- All ACM waste accounted for and delivered to disposal site approved by authorities. - Audit ACM waste disposal and AMP quarterly.	- Trip ticket system (in triplicate) for all wrapped ACM packages from contractor to GOT approved disposal site. - Monthly visual inspection of site procedures and Quarterly audit of trip ticket records	Contractor keeps records; PIG / PIC and CEP check
			145. If unexpected ACM is identified, update AIR and AMP as necessary for labeling, removal, handling, transportation and disposal of ACM waste.	PIC (IES)	Included in Contract of PIC	AIR and AMP updated	When unexpected ACM is identified	PIG / PIC
9	Construction activities causing accidental damage to existing services	- Interference with existing infrastructure; - Water supply contaminated, and power and telecommunications supplies disrupted through knocking over poles or breaking of	146. Consult with service providers to minimize physical impacts on public infrastructure and disruption to services; 147. Reconfirm power, water supply, telecommunications and irrigation systems likely to be interrupted by the works; 148. Inform affected communities well in advance; 149. Contact all relevant local authorities for utilities and local village groups to plan re-	Contractor / PIG	Included in Contract of Contractor	Any services damaged are rehabilitated/reinstated quickly; Services re-re-routed / Service disruptions minimized	As required - visual inspection, consultation with service providers. No complaints	Contractor keeps records; PIG / PIC check

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
		water, steam or sewer pipelines during works.	provisioning of power, water supply, telecommunications and irrigation systems; 150. Relocate and reconnect utilities well ahead of commencement of construction works and coordinate with the relevant utility company at the district and district levels for relocation and reconnection well before works commence; 151. Arrange reconnection of utilities and irrigation channels in the shortest practicable time before construction commences; and 152. If utilities are accidentally damaged during construction, it will be reported to the PIG / PIC, ALRI and utility authority and repairs arranged immediately at the contractor's expense.					
10	Borrow and quarry, sourcing of construction materials	Water and soil erosion of borrow pits/areas	153. Use quarry sites approved by the local authorities with highest ratio between extractive capacity (both in terms of quality) and loss of natural state. 154. Refill borrow pits as required by CEP using inert surplus spoil material. 155. Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage to avoid creation of water bodies favorable for mosquito breeding. 156. The excavation and restoration of sites and borrow areas, as well as their immediate surroundings, will be undertaken in an environmentally sound manner to the satisfaction of the PIG / PIC. 157. Upon completion of construction, borrow areas will be backfilled or temporarily fenced, awaiting backfilling, to prevent and reduce wind and water erosion, and generation of dust.	Contractor / PIC	Included in Contract of Contractor	Adherence to approved locations / schedule;	Quarterly. Check sites in use.	Contractor keeps records; PIG / PIC check
11	Chance finds and Accidental encroachment into historical / cultural sites	Impacts on physical cultural resources or cultural property sites not referred to correct authority (MOC)	158. Procedure for "chance finds" of physical cultural resources included in SSEMP; 159. Site agents will be instructed to keep a watching brief for relics in excavations and be aware of the procedure for chance finds; 160. Should any potential items be located, the PIG / PIC will immediately be contacted, and contractor will voluntarily and temporarily stop work in that area;	Contractor;	Included in Contract of Contractor	Sites and/or resources discovered, and the protection measures being put in place	During activities - stop work order issued; Site/resources dealt with appropriately	PIG / PIC; MOC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			161. Stop civil work and protect / fence the site from disturbance; 162. Contractor with the assistance of the PIG / PIC will determine if that possible physical cultural resources item is of potential significance and contact ALRI to pass the information to MOC (the relevant authority in GOT) who will be invited to inspect the site and work will be stopped to allow time for inspection. 163. Activities will not re-commence until the MOC has signed-off that the site/resources have been dealt with appropriately and that work may continue. 164. The Contractor will be responsible for complying with the requirements of MOC and the PIG / PIC will monitor the same. 165. If any cemeteries or religious sites are unearthed, the site will be fenced and segregated so as not to disturb it during construction and to preserve access for devotees.					
12	Encroachment into terrestrial habitats, effects on flora and fauna	Impacts on terrestrial habitats; Local species affected.	166. Contractor's site office, work yard and material storage, will all be located as approved by PIG / PIC in consultation with local authorities; 167. Invasive species will not be introduced. 168. Vegetation clearance during construction activities will be minimized and no greater than the absolute minimum to minimize chances of soil and surface destabilization in line with the detailed designs; 169. All replanting and compensatory tree planting (if necessary)[63] will be planned in full agreement with the local forest authority. Pistachio trees may offer a favorable plant for reestablishment due to their wide spreading root system. 170. Construction workers will be informed about general environmental protection and the need to avoid un-necessary disturbance of the environment outside the construction	Contractor	Included in Contract of Contractor	Included in awareness training with information related to habitats and flora/fauna in the area surrounding.	Visual inspections during monitoring of camp and work sites; Re-vegetation activities as per EMP; Consultations with villagers and workers	PIG / PIC

[63] There are no gardens, plantations and no individual trees that might require removal although gardens, homesteads and plantations are a feature of the surrounding area.

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			area unless justified on engineering grounds and approved by PIG / PIC. 171. Use of guns and hunting equipment by workers will be banned and workers will be dismissed for hunting or being in possession of wildlife.					
13a	Operation of construction plant and equipment creating fumes, smoke and dust	Fumes, smoke and dust nuisance cause respiratory irritations or illness on workers and nearby community.	172. Maintain all engines, compressors and powered mechanical equipment to minimize emission of fumes and smoke. 173. Plan an effective schedule of water spraying. 174. Increase the watering if there are grievance and evidence of respiratory illness. 175. Provide used drums filled with water for active working areas for the workers to bale water locally on to the work areas to reduce dust nuisances / hazards. 176. Provide orinasal (3MType) dust masks for workers at the active dusty working areas to reduce risks from inhaling dust and issue orinasal masks with other safety gear at the beginning of each shift as required.	Contractor	Included in Contract of Contractor	Included in awareness training.	Visual inspections during monitoring of camp and work sites; Consultations with villagers and workers	PIG / PIC
13b	Presence of vehicles and equipment in villages, use of people's land for access to construction site, traffic and safety issues	Traffic and access disrupted during construction; Traffic safety affected	177. Contractor will prepare a traffic management plan as part of the SSEMP detailing diversions and other measures; 178. Strict speed limits (20 kmph) to be observed in villages; 179. Local village made aware of proposals and to publicize; 180. Signs and other appropriate safety features will be used to indicate routes for construction traffic and construction works are being undertaken; 181. Contract clause to be included specifying that care must be taken during the construction period to ensure that disruptions to access and traffic are minimized and that access to important local facilities is always maintained; provincial and local officials will be consulted in the event that access to important local facilities has to be disrupted for any time and temporary access arrangements will be made; 182. Construction vehicles will use local access roads, or negotiate access with	Contractor, Village (publicize)	Included in Contract of Contractor	No. of accidents or events; Maintenance of access; Signage; Road free of materials and debris; Haulage routes rehabilitated	During activities - Visual inspection; Consultations; Review of traffic management plan	PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			landowners, rather than drive across locally owned land, to obtain access. Where local roads are used, they will be reinstated to their original condition after the completion of construction work; 183. The access road(s) will be kept free of debris, spoil, and any other material at all times; 184. Disposal sites and haul routes will be identified and coordinated with local officials; No fly-tipping (illegal waste disposal) will be permitted. 185. Provision of adequate protection to the public in the vicinity of the construction work sites, including advance notice of commencement of works, installing safety barriers if required and signage or marking of the work areas; and 186. Provision of safe access across the work site to people whose work and access are temporarily affected during construction activities.					
13c	Presence of construction workers from outside the project area.	Community health and safety risks, competing demand on local utilities and public services, e.g. water, clinic	187. The contractor will make provision to ensure the construction workforce attends STI and HIV/AIDS prevention workshops provided through an approved service provider. The workshops will be delivered to the contractor's workforce prior to commencement of any civil works; and 188. Village based community awareness raising about transmission of STIs and HIV, reproductive health and safe sex. The program will be implemented after contractor mobilization when training staff are in post and prior to construction works commencing.	Contractor, Village Chiefs, PIC/PIG; approved service provider	Included in Contract of Contractor	HIV/STIs awareness campaign implemented; ESO and HSO recruited; Training implemented; Provision of safety equipment; Signage and security to prevent unauthorized people entering camp; Signage installed as required;	As required; Monthly or after complaint - ESO and HSO recruited; Training records; Staff records; Consultations with villagers; Checking of complaints; Consultations with workers re: training	PIG / PIC;
13d	General work tasks entail hazards and risks due to working methods and location	Safety of work force is affected	189. At least one month before construction commences the contractors will demonstrate to the PIG they are properly resourced and a qualified/experienced Environmental Safeguards Officer (ESO) Health and Safety Officer (HSO) and Community Liaison Officer (CLO) will be identified by the contractors.	Contractor,	Included in Contract of Contractor	No. of accidents or events; Maintenance of access; Signage;	During activities - Visual inspection; Consultations;	PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			190. The contractors will demonstrate in the bid that they have prepared to engage a Trained Asbestos Supervisor (TAS) and Trained Asbestos Workers (TAW, at least five workers) to be instructed during the preconstruction phase during AMP training by the IES and NES; 191. The contractor will identify named staff in the preconstruction phase for training by the IES and NES as TAS and TAWs to be instructed and inducted in the implementation of the Asbestos Management Plan with follow up with toolbox talks on a daily basis for work with ACM; 192. The contractor will establish safety measures as required by law and by good engineering practice and provide first aid facilities at work sites, in vehicles and establishment of a first aid/health post at the contractor camp; 193. Workforce training for all workers starting on site will include safety and environmental hygiene. The contractor will ensure to conduct induction training (assisted by PIC) for all workers on safety and environmental hygiene at no cost to the employees. 194. The contractor will instruct workers in health and safety matters before they start work as required by law and by good engineering practice including first aid facilities. This will include instruction and induction of all workers in health and safety matters (induction course) including construction camp rules and site agents will follow up with toolbox talks on a weekly basis. 195. The contractor will schedule regular (e.g. weekly tool box talks) to orientate the workers on any changes or updates in health and safety issues related to their activities as well as on proper use of PPE ; 196. Workers will be provided with appropriate personal protective equipment (PPE) such as safety boots, helmets,				

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			reflector vest, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers; 197. Reversing signals (visual and audible) will be installed on all construction vehicles and plant. 198. Potable water will be provided and sufficient water of will be maintained at all times in all work locations; 199. Where worker exposure to traffic cannot be completely eliminated, protective barriers and warning sighs will be provided to shield workers from passing vehicles; 200. Construction camps will be provided with toilets/sanitation facilities in accordance with local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities will be well maintained and cleaned regularly to encourage use and allow effective operation and emptied regularly so as never to overflow. 201. Workers having to work near canals or other deep water courses will be instructed in safe procedures for work near water. 202. Fencing and physical barriers will be installed at the edge of all deep excavations greater than 1m deep, sides of temporary bridges and on all areas and sides of temporary works; 203. Where workers must perform removal and construction activities and exposure to water hazards cannot be completely eliminated, protective barriers and warning sighs will be provided to inform and shield workers from the hazards. Flotation devices will be available at the worksites near canals with water deeper than 50cm. 204. Work in deep trenches (>1m deep) will only be carried out when the water source in the irrigation system to the relevant area has been turned off and isolated. During flushing of water through drainage and irrigation pipes workers will exit the trenches during times when the drainpipe flushing water will flow.				

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
14	Interaction with local community	Safety of local community is affected	205. Ensure site security and guards keep the public out of dangerous areas; 206. Provide warning signs at the periphery of the site warning the public not to enter. 207. Restrict the speed of Project vehicles and also control traffic by contra-flow and provide flag men and warning signs near the works if the traveling lanes must be temporarily reduced. 208. Impose speed restrictions on Project vehicles and equipment traveling within 100m of sensitive receptors (e.g. residential, schools, places of worship, etc.); 209. Educate drivers on safe speeds and other safe driving practices to minimize accidents and prevent spill of spoil, hazardous substances (fuel and oil) and other construction materials during transport; 210. Provide trench barriers and covers to other holes and any other safety measures to keep the public out of the works; 211. Within 100m of settlements and towns fencing will be installed prior to excavation work commencing on all sides of temporary excavations. 212. Provide information boards near the work sites to inform and instruct the public on how to conduct themselves and to be aware of their surroundings if they must approach the works. 213. Refresh information boards as necessary and also show the name and telephone contacts in PIG / PIC and contractors offices for complaints about the works. Information boards will also state that the PIG / PIC and contractor have an open-door policy as regards complaints. 214. Appoint ESO, HSO and CLO for environmental, health and safety and community concerns and to liaise with the PIG; 215. Install barriers (e.g., temporary fence) and signs warning the public not to enter construction areas to deter pedestrian access;	Contractor, Village leaders (ensure cooperation)	Included in Contract of Contractor	No. of accidents or events; Maintenance of access; Signage	During activities - Visual inspection; Consultations;	PIG / PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			216. Provide adequate signs and security at the contractor base camp and prevent unauthorized persons (including children) entering work areas and camp. 217. Backfill trenches immediately upon completion of construction works or temporarily fence them, awaiting backfilling; 218. Prevent proliferation of mosquitoes by installation of effective drainage to avoid formation of stagnant water; 219. Liaise and inform the Hukamat to ensure community awareness raising about public interaction with the works and health and safety, transmission of STIs and HIV, reproductive health and safe sex. The program will be implemented after contractor mobilization when training staff are in post and prior to construction. 220. Ensure no child labour will be used;					
15	COVID-19 Prevention and task force	Risk that COVID-19 can spread through the workforce or population unchecked.	221. ALRI, PIC and contractor will form a COVID-19 prevention task force. 222. COVID-19 prevention task force is responsible for socialization, education and COVID-19 prevention during the project implementation. 223. The task force and medical staff discuss, advise and campaign on COVID-19 prevention techniques.					
			224. Prepare COVID-19 health and safety management plan and emergency response plan as part of the SSEMP and implement. 225. Install posters about the appeal or advice to prevent COVID-19 (washing hands, wearing mask) at strategic places on the project site. 226. Medical personnel check every worker's temperature morning and evening. Sick persons (temp. ≥38℃ prohibited from project site. 227. Identify COVID-19 vulnerable in work force including elderly people and those with underlying health issues. 228. Conduct virtual meetings if necessary and implement physical distancing for direct meetings/ field work.	Contractor	Included in Contract of Contractor	COVID-19 awareness promulgated and campaign implemented;	Monthly Quarterly / as required; or after outbreak of COVID-19 Checking medical records and COVID-19 posters and records of symptoms	ALRI/PIC

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
			229. Provide PPE Make wearing a mask a normal part of being around other people. 230. Continue with the usual environmental and social management training, adding self-hygiene and COVID-19 related training as appropriate. 231. Assess the extent to which work schedule needs to be adjusted (or stopped) to reflect prudent work practices. taking into account Government advice and instruction. 232. The community will be made aware of all measure being implemented to limit contact between workers and the community, procedure for entry/exit to the site, the training being given to workers and the procedures that will be followed by the project if a worker become sick.					
OPERATION PHASE								
1	Air quality impacts during operation	Exhaust emission from vehicles, dust from aggregates for repairs, , dust generated by heavy vehicles transporting materials on unsealed roads, uncovered loads on trucks.	233. Water will be sprayed if fugitive dust is being generated, and more frequently during windy days. 234. Operational equipment being maintained to a good standard and checked to ensure they are maintained in working order.; 235. Prohibition of use of equipment and machinery that causes excessive pollution (i.e. visible smoke); and 236. Ensuring vehicles transporting potentially dust-producing material through built up areas are not overloaded, are provided with adequate tailboards and sideboards, and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle) during transportation.	ALRI / WUAs	Included in maintenanc e budget	Assessment and response to maintenance requirements	During operations	ALRI
4	Routine and ongoing maintenance To respond to constriction of water flows through I&D blocking water flow;	To remove and dispose blocking materials, clear canals etc. Need for materials for on-going maintenance leads to acquisition of new source areas affecting properties.	237. Follow waste disposal requirements under construction phase or as instructed by CEP 238. Follow waste disposal requirements as under construction phase	ALRI / WUAs	Included in maintenanc e budget	Assessment and response to maintenance requirements	Before operations are re-instated	ALRI

	IMPACT MITIGATION					IMPACT MONITORING		
	Project activities	**Impact / Risk**	**Mitigation measures**	**Mitigation Responsibility**	**Mitigation Cost ($)**	**Parameter to be monitored**	**Frequency and means of verification**	**Monitoring Responsibility**
		Standing water degrades causes waterlogging of surrounding environment						

ACM= Asbestos Containing Material, AIR = Asbestos Investigation Report, AMP = Asbestos Management Plan, ALRI = Agency for Land Reclamation and Irrigation, CEP = Committee on Environmental Protection, CLO = Community Liaison Officer, GOT = Government of the Republic of Tajikistan, IES = International Environmental Specialists with expertise in asbestos abatement and management, ESO = Environmental Safeguards Officer, EMMP=Environmental Mitigation and Monitoring Plan, EMP = Environmental Management Plan, HSO = health and safety officer, MOC = Ministry of Culture, PIG = Project Implementation Group, PIC = Project Implementation Consultant, PPE = Personal Protective Equipment, SSEMP = Site Specific Environmental Management Plan, TAS = Trained Asbestos Supervisor, TAW = Trained Asbestos Worker

E. Environmental Management Costs

361. The estimated costs for environmental management include costs for staffing, mitigation, monitoring during construction and permitting costs. Most mitigation measures to be implemented during the construction phase will be included in the construction contract. Thus the contractors will be responsible for implementation of mitigation measures that will be part of the construction. Therefore these will be included in the Bill of Quantities (BOQ) for construction as a line item for implementation of SSEMP (including AMP). The costs for training proposed include the estimated costs incurred towards the site visits, travel to the training program by the participants, printing of training materials and other logistic arrangements. The costs involved towards preparation of training material and imparting of training are covered in the PIC costs. **Table VII-5** and **Table VII-6** provide a working estimate of the cost of mitigation measures.

Table VII-5. Summary of Estimated Costs for Contractor's Environmental Management Plan Implementation

Item	Quantity	Unit Rate	Estimated cost
SSEMP preparation	Lumpsum	-	$10,000
SSEMP implementation (construction mitigation measures)	Lumpsum	-	$100,000
Enhancement planting (bioengineering works for soil stabilization)	Lumpsum	-	$10,000
Purchase of PPE	Lumpsum	-	$5,000
Environmental impact monitoring# (measurement of air quality, noise level, vibration, surface/ground water quality, etc. by accredited laboratory)	Lumpsum	-	$20,000
Instrumented air or noise monitoring (@$40/sample) handheld meters#	50 samples	$40	$2,000
Asbestos Management (including the purchase of the materials and equipment listed in Table 4-1 of AMP in **Annex 1**) @500/day 20 locations	20 locations	$500	$10,000
Mobilization of ESO, HSO, TAS	60 months x 3 persons	$1,000	$180,000
Mobilization of 5 TAWs	3 months x 5 persons	$700	$105,000
Engagement of an approved service provider to undertake STIs and HIV/AIDS and COVID-19 briefings and awareness raising*	Lumpsum		$5,000
		Sub-Total	$447,000
		Contingencies (3%)	13,000
		Total:	$460,000

# Allowance in case instrumented monitoring is required to resolve complaints. * = eight sessions in 5 years
AMP = Asbestos Management Plan, CLO = Community Liaison Officer, ESO = Environmental Safeguards Officer, HSO = health and safety officer, PPE = Personal Protective Equipment, SSEMP = Site Specific Environmental Management Plan, TAS = Trained Asbestos Supervisor, TAW = Trained Asbestos Worker

Table VII-6. Summary of Estimated Costs for Project Implementation Consultant's Environmental Management Plan Implementation

Item		Unit Rate	Estimated cost
International Environmental Specialist (includes Asbestos Management IES)	4 months (intermittent)	$20,000	$80,000
National Environmental Specialist (NES)	30 months (intermittent)	$2,500	$75,000
Asbestos sample analysis by accredited laboratory ##	Lumpsum	$15,000	$15,000
Baseline measurement of water quality parameters[64]	Lumpsum	$20,000	$20,000
Training (See **Table VII-3**)	-	-	25,000

Allowance to cover courier, export/import analysis and reporting of ACM by overseas accredited laboratory

[64] See para. 172.

VIII.Grievance Redress Mechanism (GRM)

362. A Project grievance can be defined as an actual or perceived Project related problem that gives ground for complaint by an affected person. As a general policy, ALRI and PIG will work to prevent grievances by thorough implementation of impact mitigation measures and community liaison activities that anticipate and address potential issues before they become grievances. As the Project has strong public support and will not involve any involuntary land or property acquisition, significant grievances appear to be unlikely. Nonetheless, during construction and operation, it is possible that unanticipated impacts may occur if the mitigation measures are not properly implemented, or unforeseen issues arise. To address complaints if or when they arise, a Project GRM has been developed in accordance with ADB requirements and Government practices. A similar GRM has been used for ADB's ongoing Water Resources Management in Pyanj River Basin Project (WRM PRB),[65] and it is proposed to adapt that GRM as a systematic process for receiving, recording, evaluating, and addressing affected person's Project-related grievances for the Project transparently and in a reasonable period.

363. In order to address GRM requirements, the following GRM that was discussed and agreed in 2019 is recommended by ALRI to be appropriate for the Project. The GRM was approved by the Director of PIG "WRM PRB" and agreed with the other relevant ALRI and PIG stakeholders shown in Table VIII-1. The GRM will be amended if necessary for the Project during the detailed design stage.

Table VIII-1. Stakeholders of Existing Grievance Redress Mechanism (GRM)

Title	Name
ALRI Director PIG PRB	Khushvakhtov U.Kh
ALRI representative (Deputy Director ALRI)	Hasanzoda H.U.
ALRI representative in M.S.A. Hamadoni area	Samadov K.
ALRI Representative in Farkhor District	Odinaev H.
ALRI Representative in Vose District	Muminov N.
Representative of Bets Consulting Services Ltd.	Matyar R.H.
Representative of LLC "Umedbakhsh"	Mirzoeva F.
Manager PIG in M.S.A. Hamadoni district	Ruziev I.
Manager PIG in the Farkhor district	Ashurov K.
Manager PIG in Vose district	Kataev A.
Engineer PIG In The Of M.S.A. Hamadoni District	Nozimov L.
Engineer PIG in Farkhor District	Salikhov R.
Engineer PIG in Vose District	Ходжаев А.
Representative of the WUA in the M.S.A. Hamadoni	Radjabov K.
Representative of WUA in Farkhor	Dustov J.
Representative of WUA in Vose	Abduloev H.
Representative of a farm in the M.S.A. Hamadoni district	Igamberdiev R.
Representative of a farm in the Farkhor district	Malaeva Z.
Representative of a farm in the Vose district	Pirakova G.
PIG representative	Abduloev F.
Representative of the POO "Nong Ken Jian Gong"	Yang JiJin

[65] 47181-002: Water Resources Management in Pyanj River Basin Project | Asian Development Bank (adb.org)

Figure VIII-1. Signatures of Representatives supporting the GRM

РЕСПУБЛИКА ТАДЖИКИСТАН

Агентство мелиорации и ирригации при Правительстве Республики Таджикистан

«Утверждаю»
Директор ГРП «УВРБРП»
Хушвахтов У.Х.

МЕХАНИЗМ РАССМОТРЕНИЯ ЖАЛОБ
Проект «Управление водными ресурсами в бассейне реки Пяндж»

Согласовано:

Представитель АМИ	Хасанзода Х.У.
Представитель АМИ в районе М.С.А. Хамадони	Самадов К.
Представитель АМИ в районе Фархор	Одинаев Х.
Представитель АМИ в районе Восе	Муминов Н.
Представитель «Бэтс Консалтинг Сервисес лтд»	Матнар Р.Х.
Представитель ОО «Умедбахш»	Мирзоева Ф.
Менеджер ГРП в районе М.С.А. Хамадони	Рузиев И.
Менеджер ГРП в районе Фархор	Ашуров К.
Менеджер ГРП в районе Восе	Катаев А.
Инженер ГРП в районе М.С.А. Хамадони	Нозимов Л.
Инженер ГРП в районе Фархор	Салихов Р.
Инженер ГРП в районе Восе	Ходжаев А.
Представитель АВП в районе М.С.А. Хамадони	Раджабов К.
Представитель АВП в районе Фархор	Дустов Дж.
Представитель АВП в районе Восе	Абдуллоев Х.
Представитель Ф/Х в районе М.С.А. Хамадони	Игамбердиев Р.
Представитель Ф/Х в районе Фархор	Малаева З.
Представитель Ф/Х в районе Восе	Пиракова Г.
Представитель ГРП	Абдуллоев Ф.
Представитель ПООО «Нун Кэнь Цзянь Гун»	Ян ДзиДзин

A. ADB Requirements

364. ADB SPS requires the implementing agency to establish a GRM to receive and facilitate resolution of affected person's concerns and complaints about the project's environmental performance during construction as well as operation phase of the project. The GRM will be scaled to the risks and adverse impacts of the project; should address affected people's concerns and complaints promptly, using an understandable and transparent process; will be readily accessible to all sections of the community at no cost and without retribution; and will not impede access to the Tajikistan's judicial or administrative remedies.

B. Grievance Types, Documentation, and Eligibility Assessment

365. Public grievances will most likely relate to environmental issues encountered during the construction phase. Grievances may include vehicle operation and transportation of heavy equipment and materials; fugitive dust emissions and construction noise; soil erosion and haphazard disposal of

waste materials in inappropriate places; and safety measures for the protection of the general public and construction workers. Resolving construction-related grievances will primarily be the contractor's responsibility under its contract with the implementing agency. Operation related grievances may occur due to complaints about the Vakhsh River Basin I&D system performance.

366. All complaints will be recorded in a systematic fashion by the Grievance Redress Committee (GRC)[66] which will be established during the preconstruction phase along the line of the GRM for the WRM PRB Project. Persons with grievances will be able to submit them to contact persons at all levels such as contractors, WUAs, FAs, ALRI District Departments, local governments and the specific focal points for complaints to be registered will be identified by ALRI prior to the pre-construction phase. The GRC will comprise representatives of the complainants, contractors, WUAs, FAs, ALRI District Departments, Hukamat and other local government officials, as necessary. Organizational charts of the GRM, including the contact persons of the entry points will be disclosed at key construction sites. The Project will provide training to the members of the PIG and the contact persons of the GRM entry points to ensure that responsibilities and procedures are clear. Effective tracking and documentation will; (i) promote timely resolution; (ii) assist in keeping concerned parties (the complainant and appropriate Project personnel) informed about the status of the case and progress being made toward resolution; (iii) record responses and outcome(s) to promote fairness and consistency; (iv) provide a record of settlements; and (v) assist when assessing the effectiveness of the process and action(s) to resolve complaints.

C. GRM Steps and Timeframe

367. The transparent Grievance Redress Mechanism (GRM) will be established to address potential disagreements and concerns of the local population concerned, in line with ADB policy requirements and GOT legislation on Citizens' Appeals. The establishment of the GRM and the procedure for filing written or verbal complaints and complaints resolution process were discussed with stakeholders in the jamoats in the public consultation meetings. The key goal of the GRM is to resolve complaints and grievances as early as practicable.

368. In the event of any unexpected adverse impact on the properties of local residents and communities, potential grievances and complaints can be addressed through the GRM. The established GRM can be applied to address both environmental and resettlement issues related to the proposed project.

369. The steps and actions below describe the process for receiving and dealing with complaints and grievances under the project: The GRM consists of 5 escalating steps. A key goal of the GRM is to solve problems early at the lowest step.

Step 1: If a concern arises, the affected person should try to resolve the issue of concern directly with the contractor (who shall inform the PIC) if during the construction phase, or the relevant ALRI District Department if during the operation phase. If the concern is resolved successfully, no further follow-up is required. Nonetheless, the contractor, PIC and the ALRI District Department shall record any complaint and actions taken to resolve the issues and report the results to the GRC. If no solution is found within 15 working days or if the complainant is not satisfied with the suggested solution under Step 1, proceed to Step 2.

Step 2: The affected person and PIC/ALRI will submit the grievance to the GRC, either directly or via other entry points such as WUAs, FAs, ALRI District Departments or community leaders. The GRC must assess the eligibility of the complaint, identify a solution, and give a clear reply within 15 working days to the complainant and to PIC/PIG and the contractor (if relevant) with the suggested solution. The contractor, during construction, and the relevant ALRI District

[66] GRC is functionally equivalent to the Project Public Complaints Unit (PPCU) in the WRM PRB project GRM

Department, during operation, shall implement the redress solution and convey the outcome to the GRC within 7 working days.

Step 3: If no solution is identified by the GRC or if the complainant is not satisfied with the suggested solution under Step 2, the GRC will organize, within two weeks, a multi-stakeholder meeting where all relevant stakeholders, including the complainant, the relevant ALRI District Department, the contractor (if relevant), and relevant WUA and FA. The meeting will aim to find in a solution acceptable to all, and identify responsibilities and an action plan. The contractor during construction and the relevant ALRI District Department during operation will implement the agreed-upon redress solution and convey the outcome to the GRC within 7 working days.

Step 4: If the multi-stakeholder hearing process under Step 3 is not successful, the GRC will inform ALRI and MEWR and the ADB accordingly. ALRI in consultation with MEWR and ADB will review the situation and attempt to develop an alternative approach to resolve the complaint within 15 working days.

Step 5: If the complainant is not satisfied with the suggested solution under Step 4 the affected person may advance the grievance to the Provincial Court. If the affected person is not satisfied with the Provincial Court judgment, there may be an opportunity for appealing to a higher level of court. The affected person may also choose to approach ADB under the Accountability Mechanism.

213. The focal points of the GRM will be the entry points for complaints to be registered in the system and the GRC will accept the complaints and grievances lodged by the affected persons free of charge. A summary of GRM activities will be reported by ALRI through the SAEMRs and sent to ADB. The GRM will be operational during the entire construction phase and during the operations until Project completion.

370. Consultations will continue throughout the construction phase as per the project's communication plan. Records including reports on environmental and social complaints and grievances will be kept in a database and the GRC will ensure immediate follow up and resolution. In order to receive and facilitate the resolution of possibly affected peoples' concerns, complaints, and grievances concerning the project's performance, the Project's GRM will be used to address any complaints that arise during the implementation of the project.

371. In addition, the GRM will include a proactive component whereby at the commencement of construction works the community will be formally advised of project implementation details, so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This proactive approach with communities will be pursued throughout the implementation of the project.

372. The GRM will address potentially affected people's concerns and complaints, using an understandable, communicated, and transparent process that is gender responsive, culturally appropriate and readily accessible to all community members at no costs and without retribution. The mechanism will not impede access to the Country's judicial or administrative remedies.

373. GRM proceedings may need one or more meetings for each complaint and may require field investigations by specific technical or valuation experts. Grievance cases shared by more than one complainant may be held together as a single case. The GRC decisions will be made by majority of members and will be publicized among the local communities and directly to the complainant(s). If the complainants are not satisfied with the GRC decisions, they can always refer to a court of law. The GRM may be amended at the preconstruction phase to suit developing needs.

374. The affected person can also directly contact the ADB Tajikistan Resident Mission. Information on grievances will be shared with ADB local focal points and with local communities at consultation meetings during the detailed design phase and throughout the project implementation. If complainants want to register a complaint with the ADB, the Focal Person will provide the complainants the following

contact information:

Table IX-2. Grievance Redress Mechanism Contact Points

ADB National Social Safeguards Focal Point Resident Mission of Asian Development Bank in Republic of Tajikistan, 45 Sovetskaya Street, Dushanbe. Tajikistan. Tel: 992 372 210558
ADB Complaint Receiving Officer, Asian Development Bank[67] Fax number: (63-2) 636-2490

[67] ADB Office of the Special Project Facilitator Accountability Mechanism | Asian Development Bank (adb.org)

IX. Conclusion and Recommendation

A. Conclusions

375. The Project offers a robust option for the enhancement of the existing I&D system. The improvement works are restricted to the existing areas where the Vakhsh River Basin I&D system was originally developed. No major realignment is expected but the geometry of the pipelines may be improved in some sections and some small areas of additional land may be required. An LARP will be prepared to establish policies and procedures for payment of compensation to affected people for lost assets (crops).

376. The Project activities are not likely to cause any significant adverse environmental impacts in the long term. Short-term impacts will be short lived and mostly reversible. The IEE confirms that the Project is classified as Category B.

377. The policy and legal framework has been reviewed to include all guidelines and legislation relevant to the implementation of the project.

378. The environment (baseline) has been described and the Project does not traverse any protected areas or areas of conservation value, including forests or other terrestrial reserves. The project is several tens of kilometers from the nearest protected area identified for important biodiversity features. The Project will not create any impacts on cultural or heritage sites and neither does it pass through densely populated areas or an area subject to heavy development. The proposed Project will not create conflicts with natural resource allocation.

379. The alternatives have been reviewed and the option presented in this IEE is viable and satisfies the needs to service the surrounding agriculture.

380. The anticipated environmental impacts in pre-construction, construction and operational phases have been identified and assessed. The impacts should be very predictable and manageable, and, with appropriate mitigation, few residual impacts are likely. Additional human and financial resources will be required to improve environmental capability of the executing and implementing agencies (ALRI/PIG) and to progress and achieve necessary statutory compliance and environmental clearance and the associated activities that also require and environmental permits under the environmental laws of Tajikistan. The most significant problem will be the removal and replacement of asbestos cement I&D pipes that will be dealt with under the provisions of the AMP that is included in the EMP. The mitigation measures under the EMP (including AMP) are based on the type, extent, and duration of the identified environmental impacts.

381. Subject to full resourcing and effective implementation of the measures identified in this IEE, the Project is considered to be in compliance with ADB SPS and GOT environmental policies. This IEE established that no significant environmental issues are expected for the Project activities that could not be fully prevented or adequately mitigated to levels acceptable for the GOT and international standards. There will be no significant residual impacts if all mitigation measures are taken, and management plans are implemented.

382. Information has been disclosed, participation of stakeholders has been encouraged and there has been consultation with the public, local authorities and persons potentially affected by the Project. There is generally good public support for the Project. A Project GRM is proposed as required under ADB SPS in order to deal with complaints during implementation.

383. The Project will have an overall beneficial impact, improving irrigation, reducing water losses, controlling erosion, reducing dust, reducing irrigation costs, while improving water management practices and socio-economic conditions. It will have some negative impacts that will nevertheless be carefully monitored and adequately mitigated.

384. The overall conclusion is that the Project is classified as Category B under ADB SPS, and therefore, the completion of this IEE (and the accompanying EMP including AMP) meets GOT and ADB's requirements and no further environmental study is required for the Project.

B. Recommendations

385. The recommendations of this IEE are that: (i) the IEE be accepted by ADB and CEP as the statement of Project's environmental effects and how they will be mitigated; (ii) the Contractor will prepare a SSEMP based on the pre-construction and construction sections of the EMP included in this IEE detailing the contractor's specific construction methodologies and submit to ALLRI/PIG for review and approval; and (iii) the Project impacts and mitigation thereof, be monitored as per the EMMP.

386. The EMP contained in this document will be included in the design proposals for all project activities. The tender documents will indicate that the Contractor will be responsible for meeting all EMP requirements through its own SSEMP, which will accept all the terms of the EMP. This ensures that all potential bidders are aware of the environmental requirements of the Project and the associated environmental costs.

387. The EMP and all of its requirements will be included in the Contractor's Contract, thereby making the implementation of the EMP a requirement under the Contract. Prior to the start of construction works, the Contractor will prepare and submit to ALRI the SSEMP, which will be approved by the PIG. If the PIG finds any non-compliance with the EMP / SSEMP, the Contractor is liable for breach of contractual obligations. The PIG will monitor the Contractor compliance with the environmental management and safety requirements in the EMP and report on Project activities during the construction phase.

388. It is recommended to strengthen capacity of ALRI through improvement of existing environmental capabilities. This will enhance national and regional coordination and communication capabilities for effective management and knowledge dissemination on environmental at a wider scale. The recommendation from environmental analysis is for the Project to be implemented as soon as practicable.

Annex 1. ASBESTOS MANAGEMENT PLAN

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AAP	Asbestos Abatement Plan
ACM	Asbestos Containing Material
AIR	Asbestos Investigation Report
ALRI	Agency of Land Reclamation and Irrigation
AMP	Asbestos Management Plan
AOMP	Asbestos Operation and Maintenance Plan
Bulk Analysis	Laboratory analysis of bulk samples of ACM
NES	National Environmental Specialist (PIC)
IEE	Initial Environmental Examination
IES	International Environmental Specialist (including Asbestos Management)
O&M	Operation and Maintenance
PIC	Project Implementation Consultant
PIG	Project Implementation Group
PIG-ES	PIG - environmental specialist
TAS	Trained Asbestos Supervisor
TAW	Trained Asbestos Worker
WUA	Water Users Association

DEFINITIONS FOR ACM CONDITION

Good	No visible damage or delaminating of ACM,
Moderate	Minor visible damage e.g. <5% but no delaminating of ACM
Fair	Significant damage or delaminating of >5% ACM
Poor	Visible damage or delaminating to >30% of ACM or visible debris

1. Description of the project and location

1. This Asbestos Management Plan (AMP) is for the Irrigation and Drainage (I&D) Modernization of the Vakhsh River Basin project (the Project, **Figure 1-2**). In line with best practice, this AMP is written so that it can be used as a self-contained document. The AMP presents the preliminary results of asbestos investigation, an asbestos abatement plan (AAP) and an asbestos operation and maintenance plan (AOMP) for Asbestos Containing Materials (ACM) to remain in place. The AMP is compiled prior to any asbestos sampling and analysis and is based on certain assumptions about the locations of ACM, a preliminary scope of work and information received from the Project preparation team.

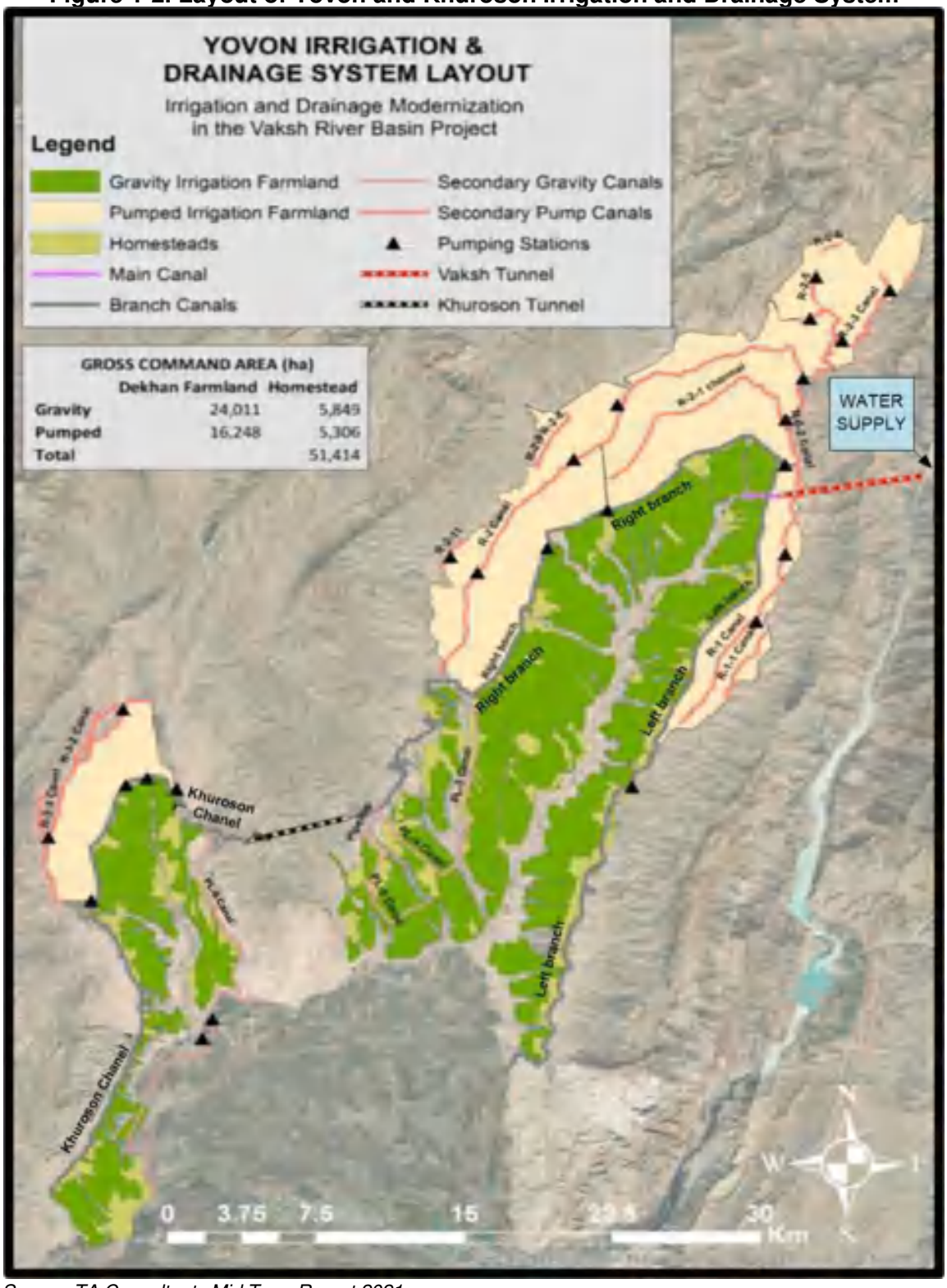
2. The Vakhsh River Basin I&D primary system upgrading is within the jurisdiction of Agency of Land Reclamation and Irrigation (ALRI, an executing agency of the Project) and will restore the carrying capacity of major canals by desilting and resectioning; accompanied by selective lining of bypass canals. At the secondary - tertiary level, in four selected WUA areas, within a 9,827 ha area, the project will clean and desilt existing pipelines, replace failed sections of buried pipelines, and install new risers and modern hydrants for water delivery to farmers. Importantly, pipelines which currently discharge unused irrigation water to waterways which flow to the rivers draining the valleys will be closed so that there are only controlled releases from their outfalls, as required for periodic pipeline flushing.

3. The secondary-tertiary infrastructure is within the jurisdiction of four WUAs: WUA Chorgul, 2012, WUA Norin, WUA Obi Yovon, and WUA Istoqol 2010. The secondary-tertiary infrastructure includes; (i) the secondary buried pipe and tertiary irrigation systems as well as outfall structures; (ii) open channels / drainage ditches; and (iii) secondary canal P4 and its (pipe) outfall structure as it falls within WUA Istiklol 2010.

Figure 1-1. Water User Associations included in this Phase 1 of the Project

Source: TA Consultants Mid Term Report 2021

Figure 1-2. Layout of Yovon and Khuroson Irrigation and Drainage System



Source: TA Consultants Mid Term Report 2021

4. Two of the system's six primary (first stage lift) pumping stations in the Khuroson Valley, PS#26 and PS#6 (Rassvet) will be upgraded and modernized with more efficient variable speed pumps and controllers to reduce electricity consumption and improve volume and reliability of water supply to their command areas.

5. For purposes of this report, the site for investigation and AMP includes all of the facilities, canals, pipes, drains and connecting apparatus serving the I&D system throughout Yovon I&D system in the named WUA regions and the Khuroson pump stations. ACM is so far reported to be present in the form of asbestos cement I&D pipes at various locations. The options for asbestos abatement are removal, encapsulation, enclosure, or deferred action. The advantages and disadvantages and criteria for choosing appropriate asbestos abatement methods are also presented (Appendix B).

6. Most products made today do not contain asbestos, but the use of asbestos is not banned in Tajikistan. Worldwide it is common to find suspected ACM in buildings and installations established before the mid-1980s. Some common examples are presented in **Table 1-1**.

Table 1-1. Typical asbestos containing materials

LOCATION	TYPICAL ASBESTOS CONTAINING MATERIALS
Thermal insulation	lagging materials for steam and hot water pipe, heater, boiler, furnace, chimney, flue duct
Electrical insulation	switch box arc chutes, cable tray
Sound absorption	acoustic plaster sprayed on ceiling and wall
Fireproofing	filling material in wall and floor penetration, laboratory bench top, fire blanket, fire curtain
Building materials	corrugated cement sheet for roofing, wall board, cement roof tile, asphalt roofing felt, vinyl floor covering, cement soil stack, cement pipe, refuse chute, ceiling tile
Friction products	brake lining, clutch facing
Building services	air duct flexible joint, cable trough and conduit, cistern, cement pipes
Sealing and jointing	gasket, gland packing materials for pump and valve, putty, adhesive

Source: https://www.asbestos.com/products

7. It is not possible to tell with certainty whether a material contains asbestos by its appearance or color. Therefore, it is safer to take a precautionary attitude and treat all suspect materials as asbestos containing unless proved otherwise by a trained and experienced asbestos specialist.

8. ACM is known to be present in the form of asbestos cement I&D pipes but the condition, type, and concentration of asbestos in the ACM is not known in detail. It is not known if other parts of the system contain ACM. Detailed asbestos investigation and reporting will be conducted to meet international standards.

9. There are reasons to suspect that there are other locations in the Project site where typical suspect ACM may have been used such as: (i) water pumps; (ii) cement pipes serving inspection chambers and off-take gates; (iii) curved cement flumes and concrete channels. As the system was constructed in the 1960s and 1970s, when asbestos was in common use, representative sampling will be undertaken from other typical cement sections and other typical locations for ACM.

10. Knowledge of the type, condition and form of ACM is important because these affect the risks. Low risk materials are generally not friable and may be enclosed or encapsulated such as in the case of the ACM pipes in the Vakhsh River Basin I&D system. High risk materials are friable (surface disintegration with rubbing by fingers) and exposed in enclosed spaces. However, low risk materials can be made high risk if, for example, cement asbestos pipes are cut with powered abrasive saws so releasing large amounts of fiber that is difficult to control. Therefore the form, type, and condition, as well as the way the asbestos in handled and removed, affect the methods needed for asbestos management or abatement.

11. At this stage ACM is presumed to be present throughout the system and a generic asbestos abatement strategy has been developed for the Project. This AMP will be updated during the detailed design stage. The precautionary principle has been applied and all the materials above are assumed to be ACM unless proven not to be ACM, detailed analysis and quantification can be made at a later stage to bolster the asbestos management.

12. However, available laboratories in Tajikistan have not demonstrated they are capable of bulk analysis[68] of ACM in line with international criteria[69] therefore accredited analysis must be made to acceptable international standards (if necessary, as late as in Year 1 of implementation; just before the other detailed engineering investigations for the Project.

13. Therefore the asbestos investigation and completion of the detailed Asbestos Investigation Report (AIR) needs to take place at the commencement of the detailed design services to determine the full extent of ACM in the parts of the system to be modernized. The AMP will then be updated.

14. For purposes of this report, the ACM is presumed present in the I&D pipes. The presence of the ACM has been backed up with anecdotal information gathered by the Project preparation team.

2. Layout and condition of Asbestos Containing Material

2.1 Asbestos Investigation (May 2021)

15. Information is based on observations made by the Project preparation team in; (i) the Mid Term Report; (ii) draft AOMP and (iii) SR4 Assessment of I&D systems and condition of asbestos cement pipelines in selected WUAs in A. Jomi and Yovon districts.70 To accomplish this investigation, no visual survey, physical inspection of potential ACM from the structures has been carried out by this AMP's author to date, but it is necessary to prepare a preliminary AMP to address the potential for on-site environmental liabilities associated with asbestos. The AMP will be updated at the detailed design stage.

2.2 Systematic Investigation of Asbestos Containing Material (required at detailed design stage)

16. The information available at this stage is limited but sufficient to determine a preliminary AAP and AOMP in this AMP for the ACM I&D pipes.

17. It is relevant that the available laboratories in Tajikistan may not be capable of bulk analysis of ACM in line with international criteria therefore it is prudent to identify in principle how accredited analysis can be made to acceptable international standards so that the asbestos management can be consolidated; if necessary, as late as the implementation stage in Year 1; concomitant with a time just before the other detailed engineering investigations are rolled out.

18. In principle, there are laboratories in other ADB member countries that are recognized internationally through accreditation schemes that use inter-laboratory testing, e.g. HOKLAS (Hong Kong), NATA (Australia), IANZ (New Zealand), and Singapore (SAC-SINGLAS). The member laboratories participate in periodic inter–laboratory testing to assure quality control and can typically accomplish analysis and reporting in a few days after receipt of samples.

19. It is possible (although not routine) to dispatch ACM samples between accredited laboratories in inter-laboratory accreditation schemes. It is suggested that samples could be transferred using this mechanism with the cooperation of the accreditation scheme and the environmental authority in a third

[68] http://www.mdcampbell.com/niosh/oshameth/id191/id191.htm

[69] Nevertheless it would be of great assistance if some indicative sampling and analysis could be undertaken earlier and before the detailed design stage to allow advance planning and provide further information and confirm or refute the assumptions about the locations of ACM.

[70] The Project scheme extends over parts of three districts, Yovon, A. Jomi and Khuroson in Khatlon Province.

party ADB member country (e.g. PRC, the HOKLAS laboratory accreditation scheme in Hong Kong or SINGLAS Singapore). Preliminary investigations indicate that with a modest lead time and the necessary permissions and declarations, ACM samples can be received by laboratories through international courier services. However, the dispatch and liaison with authorities would need to be handled by an experienced International Environmental Specialist with strong expertise in asbestos abatement and management (IES) and would require a sufficient lead time.

20. However, permissions must be obtained from laboratories' and their respective environmental authorities to be able to receive correctly sealed and labelled samples via international courier. This is possible and sufficient lead time should be allowed at the detailed design stage for a qualified IES to supervise the process to take samples and seal and identify them before dispatch to the laboratory of choice and arrange to ensure that the selected laboratory will receive the necessary permissions in a timely manner.

21. Access appears to be in the open air and generally good and would not prevent the removal of the ACM from the identified locations. Care will however be required to avoid interference with other project workers and public and any other contractors, but the abatement should generally be able to progress in line with best international practice.

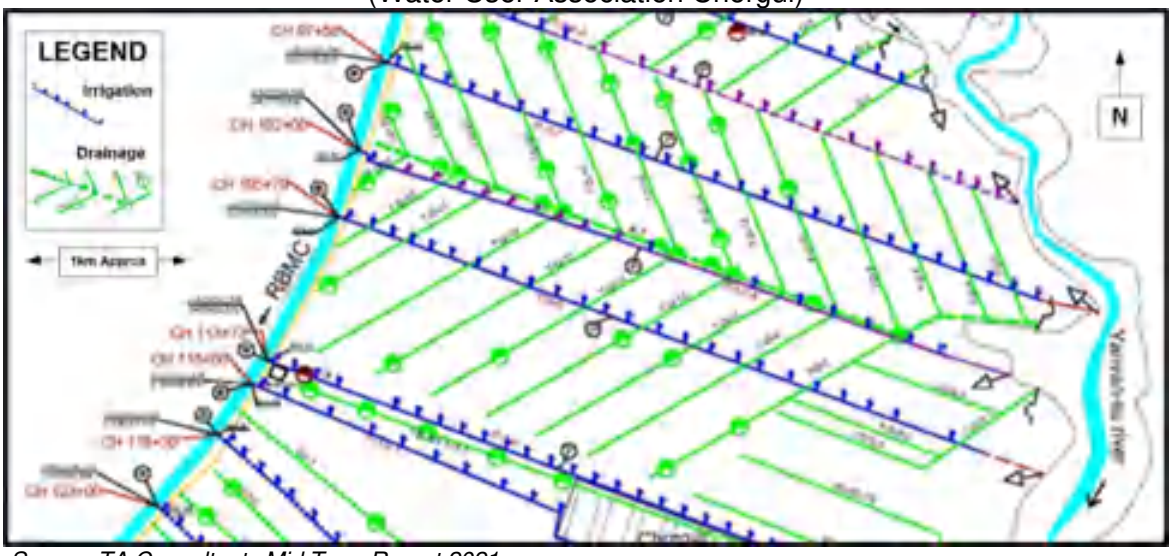
2.3 Description of locations and condition

22. The ACM is believed to be mainly present in the irrigation and slotted drainage pipes that are concealed beneath the ground at different depths depending on the location in the gravity flow system. Irrigation pipe work is generally buried around 1m below the ground level or shallower. Drainage pipes may be as deep as 3m below ground level. Therefore irrigation or slotted drainage pipe would not generally be exposed to the air or present the risk of airborne fiber release; unless deliberately disturbed and brought to the surface.

23. Knowledge of the type and condition of ACM is important because the risks from asbestos bound in a cement or resin matrix (typically low risk) is much less than friable materials such as sprayed acoustical and fire treatments on structural steel, plaster pipe insulation and asbestos rope gaskets (typically high risk). Knowledge of the form of asbestos is important because the health effects associated with blue asbestos (crocidolite) and brown asbestos (amosite) have generally been reported to be greater than for white asbestos (chrysotile). Thus, the form, type, and condition, as well as any limitations on the way ACM can be handled and removed, will affect the engineering controls needed or chosen for asbestos management or abatement. In this case information suggests the ACM pipes were manufactured to contain about 15% white asbestos (chrysotile).

24. A typical layout for the I&D systems in one WUA is presented in Figure 2-1.

Figure 2-1. Typical layout for irrigation and drainage pipe systems
(Water User Association Chorgul)



Source: TA Consultants Mid Term Report 2021

25. At some locations, the irrigation and slotted drainage pipes are nearer the surface such as at the gated off-takes at the canals or where disturbance and erosion has exposed pipes through natural forces. Some significant sections of the irrigation and slotted drainage pipe systems are presumed not to be serviceable anymore and therefore must be replaced. Therefore disconnection, replacement and reconnection will require work with asbestos.

26. However, the exact sections for removal and replacement will not be known until the detailed design stage or perhaps later. Removal of the non-serviceable pipes will therefore be work with asbestos and must meet an international standard to control the risks of exposure to asbestos fiber to workers and public.

27. In the numerous inspection chambers that are silted up and blocked, the condition of any exposed ACM cannot be determined at this stage. The pump in pumping stations may also contain ACM gland packing or gaskets71 and the condition of any ACM cannot be determined at this stage.

[71] http://www.mesothelioma.com/asbestos-exposure/products/pumps/

Figure 2-2. Typical condition of irrigation and drainage pipes.

28. Based on observation (Figure 2-1) there are potentially a number of other locations in the Project site where ACM would typically have been used: (i) Water pumps typically contain pump packing and are sealed with gaskets that may contain ACM; (ii) Pipes presumed to be ACM are connected to in-line inspection chambers and off-take gates at the canals and the gates will be replaced and inspection chambers cleaned depending on their condition; (iii) Curved cement flumes are present in the system and this type of curved cement has traditionally used asbestos fibers to help form and hold the curved shape during casting; (iv) The system was constructed at a time when asbestos was in common use (particularly in the 1960s and 1970s) and the pipes and flumes and all other curved cement sections will be checked in case they are ACM. Table 2-1 summarizes the known and probable ACM in the Project system based on observations to date.

Table 2-1. Asbestos Containing Material (ACM) locations and condition (Tentative)

Functional Space #	Zone	Location	Material	Quantity	Condition ##	Type of ACM (expected TBC)
Main canal off-takes to Secondary system	1	ACM Pipe at junction with off take pipes	TBC (Potentially ACM Cement / pipes may need to be removed, (TBC)	Unknown (m^3) TBC	Good to Moderate (TBC)	Type 1
Irrigation Cement Pipes and inspection chambers	2	Pipe work throughout irrigation system	ACM Cement Pipe	Unknown (m^3) TBC	Good to Moderate (TBC)	Type 1
Drainage Cement Pipes and inspection chambers	3	Pipe work throughout drainage system	ACM Cement Pipe	Unknown (m^3) TBC	Good to Moderate (TBC)	Type 1
Pumps in pumping stations	5	Khuroson Valley, PS#26	Pump packing and gaskets	Unknown (m^3) TBC	Unknown probably Moderate (TBC)	Type 2
Pumps in pumping stations	6	Khuroson Valley, PS#6 (Rassvet)	Pump packing and gaskets	Unknown (m^3) TBC	Unknown probably Good to Moderate (TBC)	Type 1
Unknown, TBC	7	Unknown, TBC	Unknown, TBC	Unknown, TBC	Unknown, TBC	Unknown, TBC

TBC = To be confirmed after inspections and Asbestos Investigation Report in detailed design stage

Notes: This table to be extended at the detailed design stage after asbestos investigation and bulk sampling and analysis

#: *Photographs of the ACM identified in the AIR will be included in the updated AMP at the detailed design stage as an Attachment*

##" *Likely condition based on available information TBC*

Type 1 ACM: is non-friable and cannot be easily crumbled or pulverized with the fingers. The Asbestos fibres in the material are locked in by cement, vinyl, resin or another binding agent. However, cutting, grinding, abrading, sanding, breaking, drilling, or vibrating the material may be enough to release the fibres.

Type 2 ACM: is friable and fibres are easily released by crumbling or pulverizing with the fingers.

3. Asbestos removal strategy

3.1 Asbestos Containing Material not to be Removed

29. All serviceable ACM I&D pipe work will be cleared, flushed and will not be removed as part of the abatement process. The ACM to remain will be labelled such as where the ends of serviceable pipes are exposed during the ACM removal process, or at the pipe inspection chambers. Where ACM is discovered in the pumping station pumps, where not to be removed, these will also be labelled accordingly as ACM. Any other ACM that is identified and not be removed will also be labelled. All ACM not to be removed will be labelled as practicable and entered in the AOMP for monitoring. Subsequent removal of any ACM will be notified to ALRI/Project Implementation Group (PIG, an implementing agency of the Project) and must follow requirements of this AMP. Appendix A presents an internationally recognized ACM label.

3.2 Asbestos Containing Material to be Removed

30. All ACM in the non-serviceable I&D pipe work to be replaced will be removed as part of the abatement process. The ACM will be removed prior to any renovation works. Removal of any ACM in pipes or other locations will be notified to PIG/ALRI and must follow requirements of this AMP and the subsequent updates. Options for asbestos abatement and the advantages and disadvantages are presented in Appendix B.

31. The ACM materials known to need removal consist of certain sections of the ACM cement pipes in the I&D pipework. However, the extent and length and dimensions of such pipes cannot be determined at this stage. The lengths and dimensions of the ACM pipe to be removed will be determined in the detailed design stage as part of the updated AMP (**Table 2-1**). **Table 3-1** summarizes the hazard assessment.

3.3 General Safety Measures

32. The ACM pipe irrigation system is not manned on a daily basis with security guard / irrigation captain, but some local maintenance work may be carried out periodically. However, until such time as the upgrading and replacement takes place, no major work is likely to be carried out on the ACM pipes. Routine non-essential maintenance work will be suspended during the asbestos abatement work and local staff will be made aware that the subsequent abatement works are to be progressed. Access will be restricted to essential asbestos abatement staff including the Trained Asbestos Supervisor (TAS) and Trained Asbestos Workers (TAWs) for the duration of the removal works (if removal works are required). Procedures are dealt with in the following sections of this AMP.

33. Observations by the Project preparation team, undertaken around the site, indicate that there is no major problem with accumulated ACM dust and debris and there is no indication that major contamination of the site has occurred (subject to confirmation at the detailed design stage). However, in some places there appear to be some discarded sections of redundant ACM pipes near other potential ACM components. Routine preliminary decontamination by the TAS and TAWs will be superintended by the PIG environmental specialist (PIG-ES), before the main abatement works commence.

34. The ACM in the I&D pipes will be removed using methods in line with the code of practice presented in this AMP that is for removal of low-risk ACM; and supervised accordingly. ACM subsequently discovered in other parts of the system or buildings and support infrastructure that must be removed will be removed using methods in line with an updated AMP to be completed at the detailed design stage.

3.4 Staffing for Asbestos Removal

35. The Contractor and TAS will be totally responsible for completing the asbestos abatement within the given time frame. It is anticipated that a minimum of 5 competent TAWs in various trades would be employed over the whole abatement period. The PIG-ES will control and monitor the work progress of

the TAS and TAWs and if necessary, make the necessary adjustment to their trained workforce to meet the work requirements. The TAS will be full-time and will be required to assist the PIG-ES and Contractor regarding safety and health of the site personnel and to keep the necessary records.

Table 3-1. Hazard Assessment

Functional Space	Location	Material	Estimated Quantity Approx. (m^2)	Friability	Condition	Sample Number (example)	Accessibility	Asbestos Material	Overall Hazard Assessment
Main canal off-takes to Secondary system	ACM Pipe at junction with off take pipes	TBC (Potentially ACM Cement may need to be removed, (TBC)	Unknown (m^3) TBC	Unlikely (but yes if deliberately cut with machine tools)	Good to Moderate (TBC)	IDMVRB 001 to IDMVRB 010	Low to Moderate	Type 1	Low to Moderate
Irrigation Cement Pipes and inspection chambers	Pipe work throughout irrigation system	ACM Cement Pipe	Unknown (m^3) TBC	Unlikely (but yes if deliberately cut with machine tools)	Good to Moderate (TBC)	IDMVRB 011 to IDMVRB 020	Low to Moderate	Type 1	Low to Moderate
Drainage Cement Pipes and inspection chambers	Pipe work throughout drainage system	ACM Cement Pipe	Unknown (m^3) TBC	Unlikely (but yes if deliberately cut with machine tools)	Good to Moderate (TBC)	IDMVRB 021 to IDMVRB 30	Low to Moderate	Type 1	Low to Moderate
Pumps in pumping stations	Khuroson Valley, PS#26 and PS#6 (Rassvet)	Pump packing	Unknown (m^3) TBC	Yes (if deliberately disturbed)	Unknown probably Moderate (TBC)	IDMVRB 031 to IDMVRB 35	Low	Type 2	Moderate
Pumps in pumping stations	Khuroson Valley, PS#26 and PS#6 (Rassvet)	Pump gaskets	Unknown (m^3) TBC	No (if deliberately cut or abraded with machine tools)	Unknown probably Good to Moderate (TBC)	IDMVRB XXX	Low	Type 1	Low
Unknown, TBC	Unknown, TBC	Other materials not described to date TBC	Unknown, TBC	Unknown, TBC	Unknown, TBC	IDMVRB XXX	Unknown, TBC	Unknown, TBC	Unknown, TBC
This table to be extended and updated at the detailed design stage after asbestos investigation and bulk sampling and analysis. Options for abatement are presented in Appendix B									

IDMVRB = Irrigation and Drainage Modernization for Vakhsh River Basin, TBC = To be confirmed after inspections and AIR in detailed design stage, PS = Pumping Station

3.5 Permission for Asbestos Removal

36. The necessary permissions from PIG-ES will be obtained before any work is permitted in locations known to contain ACM are commenced. PIG-ES will record these permissions in the ACM Register. A minimum of one-week advance notice will be given to the PIG-ES to obtain the necessary written permissions and commence the work on the site. An estimate for completion time after the asbestos work site hand-over will be made in the updated AMP at the detailed design stage. Examples of the recording forms are presented in Appendix C and Appendix D.

3.6 Program for Asbestos Removal

37. At this stage, details of the program are not developed and will be elaborated in the updated AMP at the detailed design stage.

38. Based on experience and the available information, it is considered reasonable to allow for the whole abatement process may take place over a two-month period in due course. Allowance of two weeks preparation time in each location is prudent to allow sufficient time for preparation of supervisors, workers, materials, and equipment and checking by PIG-ES.

39. Asbestos removal work will be sequenced immediately before the replacement of pipes to minimize interruptions to service as far as possible. The final program will be determined by the PIG-ES in liaison with ALRI/WUA and any appointed IES.

4. Asbestos abatement methods

4.1 Options for asbestos abatement methods

40. Options for asbestos abatement are summarized in Appendix B. Options for the methods of dust suppression that will be adopted as far as practicable in asbestos abatement activities with low-risk ACM include:

- Containment or segregation of work area.
- Wetting of ACM before and during disturbance, using amended water where appropriate.
- Minimising the breakage and dropping of ACM and packing of debris and waste immediately after it is produced.
- Cleaning of work area by wet wiping.
- Proper bagging, handling and disposal of asbestos waste or asbestos-contaminated waste.
- Coating on any surfaces previously in contact with or contaminated by asbestos with a proper sealant.
- Decontamination facilities with copious water and wet wipes available for cleaning of workers before leaving the work area.
- Decontamination facilities with copious water available for cleaning bagged waste and equipment before leaving the work area.

41. Further options for dust suppression in asbestos abatement activities with high-risk friable ACM are included in Appendix B.

4.2 Justification of methods

42. The ACM pipe work is not found to be potentially friable in most circumstances observed so far and will not be difficult to extract. The ACM to be removed appears to be in a reasonable and still mostly serviceable condition and unlikely to result in the release of asbestos fibers unless deliberately disturbed. The work is considered low risk but there are significant quantities of ACM overall. The work will therefore be carried out in line with the method proposed below and supervised accordingly.

43. If other ACM is identified in future, this AMP will be updated and the abatement methods reviewed and supervised accordingly. The details of methods which the Contractor, their TAS and TAWs will follow are presented below.

4.3 Staff Resources and local procedures

44. Competent workers must be employed. It is expected that the CONTRACTOR will employ at least 5 TAWs on site plus at least one TAS during the course of the works. Medical examination certificates of all personnel involved in the asbestos abatement will be required for inspection and copies will be kept on site for inspection by the local health authorities.

A. Asbestos (Safety) Supervisor Identification

45. The CONTRACTOR will have an experienced full-time TAS present on site every day during the course of the Asbestos Works who will oversee all safety procedures and monitor the Segregated Works Area(s) and the work of the TAWs to ensure that ACM pipes and debris is continuously cleared away. The TAS will verify that all TAWs wear suitable close fitting face masks every day and will maintain a register to verify correct procedures and movement of all persons who enter the Controlled Works Area.[72] The TAS will also undertake all the duties as required by the local and national safety regulations as necessary.

46. The CONTRACTOR's TAS will keep a project log of all the asbestos abatement works carried out for inspection by the Project Implementation Group Environmental Specialist (PIG-ES) on site. The log will record the name of the TAS for the shift in progress and the names and identity records of all staff, TAWs and other workers and visitors to the site as well as details of the work in progress.

B. Local Procedures

47. After removal and site decontamination, all the necessary supporting structures, hoardings and working platforms must be removed and the site must be cleared and cleaned thoroughly to the satisfaction of the PIG-ES.

48. The PIG-ES will have the right to suspend the asbestos abatement work if the CONTRACTOR should fail to observe the safety rules and if there is by the CONTRACTOR any non-compliance with this work specification.

C. Site Visit

49. The CONTRACTOR will visit the Site and acquaint itself with the facilities for access, services, local conditions, and the nature, volume and particular conditions which appertain to the asbestos removal work to be carried out.

50. The CONTRACTOR will arrange for suitably capable staff to attend training by the IES for at least 5 TAWs on site plus at least one TAS and once trained, retain them for the course of the works to retrain other TAWs and TAS accordingly to make up the numbers of available trained staff.

51. A further orientation meeting to be led by the IES will take place prior to the commencement of the Asbestos Abatement Works, attended by the CONTRACTOR, ALRI and PIG-ES and the CONTRACTOR's nominated TAS.

52. ALRI and PIG can confirm the works program with the relevant authorities and ADB in due course as specified in this AMP. The CONTRACTOR will notify the relevant authorities within the requisite period of the commencement of the asbestos removal process.

---

[72] The Controlled Works Area means an area comprising the area requiring removal of ACM, for the exclusive use of executing the Works under the Contract. The controlled works areas will be shown on plan in the updated AMP at the detailed design stage. The concept is demonstrated in **Figure 4-1** together with all minimum essential storage space and access. It will generally be delineated by segregation, tapes on poles hoarding or another approved barrier.

4.4 Facilities to Conduct the Works

53. The Contractor will, before work starts, make available all the materials in **Table 4-1**.

Table 4-1. Materials, Equipment, Specifications and Methodologies

	Equipment	Specification	Methodology
1.	Transparent plastic sheeting	0.15mm thickness low density polythene (B.S.4932:1973 / equivalent)	At least two layers of transparent plastic sheeting will be used for covering the floors and wall of the Segregated Works Area(s), in sizes which minimize the need for jointing. Polythene sheeting, transparent bags and containers used for packing of asbestos waste should be able to resist puncturing by the sharp edges of the asbestos cement pipe.
2.	Duct tape / reinforced adhesive tape)	50mm wide (reinforced adhesive tape)	The piping will be carefully joined and sealed with wide (50mm) duct tape, spray adhesive capable of sealing adjacent pipes of polythene and facilitating attachment of polythene pipes to steel / concrete structure surfaces adjacent to the asbestos cement pipe.
3.	Spray adhesive	Capable of sealing adjacent pipes of polythene and facilitating attachment of polythene pipes to adjacent cement on structure surfaces or steel pipes.	The adhesive agents should be capable of adhering and maintaining the integrity of the segregated materials and Segregated Works Area(s), under both wet and dry conditions, including during the use of amended water.
4.	Segregated Works Area(s)	Control Access	The access to the Segregated Works Area(s) will be controlled at all times by supervisor / foreman / security personnel. (No public access)
5.	Wetting agent	50% polyoxymethylene ester and 50% polyoxymethylene ether ***or equivalent.*** The wetting agent will be diluted in accordance with the manufacturer's instructions. The wetting agent for the amended water will be sprayed generously to enhance penetration into the ACM.	It is mandatory to apply amended water containing a wetting agent on the asbestos materials prior to removal so as to minimize the release of asbestos fibers during the removal process. Electrical equipment / wiring within the Segregated Works Area(s) will be dead and isolated prior to the application of wetting agents.
6.	Lock down	Water based polyvinyl acetate solution (PVA) to bind traces of asbestos fiber which may remain on exposed surfaces. The PVA solution adhesive will be dyed (e.g. dark vegetable food coloring or equivalent).	Water based PVA to be used as "lock down" for spraying on to surfaces and packages of ACM waste during the final clean-up of the area will be able to bind traces of asbestos fiber which may remain on exposed surfaces. The adhesive will be dyed (e.g. vegetable food coloring) to facilitate a check as to whether it has been applied or not and to facilitate cross-checking at a later stage.
7.	Lifting appliances	Comply with the local construction sites safety regulations. Valid test certificates available onsite for checking.	All lifting appliances, i.e. wire slings, ropes, and chain blocks, must comply with the local construction sites safety regulations. Valid test certificates must be kept on site for checking at all times.
8.	Ladders and scaffolds	Made of strong materials capable of withstanding appropriate weights in line with general safety procedures.	Ladders will be used in the Segregated Works Area(s) in line with general safety procedures. Joints and ends of ladders, scaffolds, and parts of lifting gear where appropriate, will be sealed with duct tape to prevent the incursion of asbestos fibers and finished to create a smooth surface to facilitate cleaning.
9.	Face Masks (for low-risk work). (Respirators with higher protection factor needed for higher risk work with ACM).	N95 (or equivalent) face masks for dust. The face masks respirators to be provided by the CONTRACTOR will be of an approved type contained appropriate for protection against the level of asbestos fibers reasonably expected in the particular stage and environment of	The CONTRACTOR will provide respirators to all workers. The CONTRACTOR will also provide approved respirator(s) to the PIG-ES as and when requested. The methodology proposes NO CUTTING of ACM pipes and is therefore "low risk". Cutting ACM will make work "High Risk" and AMP if cutting is essential. AMP must be updated in line with the contractor's prosed methodology and costs revised accordingly.

	Equipment	Specification	Methodology
		work. In this case at least half face dust mask will be required.	
10.	Face Masks hygiene and replacement	CONTRACTOR to hold sufficient stocks of Face Masks for work under the current contract and this will be checked in the mobilization phase by PIG/PIC before contract is implemented.	The respirators will be removed when wet and be treated as contaminated ACM waste. A new half face dust mask will be provided to each worker prior to each shift, and the CONTRACTOR will hold sufficient spare face masks on site at all times for replacement purposes.
11.	Protective clothing	Protective clothing will consist of an approved disposable full body coverall, with head cover. Hard hats will also be made available by the CONTRACTOR. Coveralls will be of a disposable type. CONTRACTOR to hold sufficient stocks of coveralls for work under the current contract and this will be checked in the mobilization phase by PIG/PIC before contract is implemented.	The CONTRACTOR will provide approved protective clothing to all workers. He will also provide approved protective clothing to the PIG-ES as and when requested.
12.	Coveralls	Coveralls to be made from material which does not readily retain asbestos dust and prevents, so far as is reasonably practicable, dust penetration. (i) with integral head covering. (ii) close fitting at the neck, wrists and ankles; and (iii) without external pockets or unnecessary pleating or accessories.	The CONTRACTOR will provide approved protective clothing to all workers. He will also provide approved protective clothing to the PIG-ES as and when requested.
13.	Equipment Supplies and Inventory	CONTRACTOR to establish supply line for additional stocks of all materials: polythene sheeting, wetting agents, spray adhesive, PVA lock down, face masks, coveralls for work under the current contract and this will be checked on a monthly basis during the implementation phase by PIG/PIC as the contract is implemented.	The CONTRACTOR will provide approved protective clothing to all workers. He will also provide approved protective clothing to the PIG-ES as and when requested.

PIG-ES = Project Implementation Group Environmental Specialist, PVA = Poly Vinyl Acetate

A. Segregation, Barriers and Screens

54. The CONTRACTOR will provide suitable means to separate the Segregated Works Area from other areas of the site with barriers and other means to restrict entry of the general public

55. The CONTRACTOR will provide proper and publicly visible warning signs in English and Russian/Tajik characters as appropriate.

56. The locations of all required barriers, segregation and hoarding will be subject to the approval of the TAS and PIG-ES.

B. Holding Area / Set down area

57. On receipt of the CONTRACTOR's application, a modest area for storage of uncontaminated materials and equipment etc. will be provided for the duration of the works by ALRI/PIG/WUA, the actual locations will be discussed and agreed by the PIG-ES, CONTRACTOR and ALRI/PIG/WUA on site. The CONTRACTOR will allow in its tender for all necessary transportation for materials and equipment, etc. stored in this area.

C. Controlled Works Area(s)

58. The Controlled Works Area means all the area to support the removal ACM, for the exclusive use of executing the Works under the Contract. It includes the Segregated Works Area and the Buffer Store. The Controlled Works areas will be shown on plan in the updated AMP at the detailed design stage. The concept is demonstrated in Figure 4-1 together with all minimum essential storage space and access. It will generally be delineated by segregation, tapes on poles hoarding or another approved barrier.

D. Segregated Works Area(s)

59. Warning notices 'ASBESTOS REMOVAL OPERATIONS - AUTHORISED ACCESS ONLY TO PERSONS WEARING PROTECTIVE CLOTHING AND FACE MASK', 'NO SMOKING', and 'NO EATING AND DRINKING' will be displayed at the entrance to the Segregated Works Area(s). Smoking, drinking, and eating inside the Segregated Works Area is strictly forbidden (a separate designated resting area away from the works area will be made available for such purposes).

60. Authorized ALRI staff and the PIG-ES will have the right to enter the Controlled Works Area (footnote 72.) for site inspections at any time. The PIG-ES has the right to enter the Segregated Works Areas for site inspections at any time provided they wear the necessary Personal Protective Equipment (PPE). The CONTRACTOR will provide PPE including overalls, boots, and respirator for the PIG-ES as necessary upon demand.

61. Upon the completion of the above work, all workers inside the Controlled Works Area(s) at the time will have their respirators and protective clothing wet wiped. All equipment and all plastic sheet containment barriers will be wet wiped clean to ensure that all surfaces are completely clear of visible debris and dust.

E. Buffer Store

62. Storage of double-bagged contaminated waste will be in a designated buffer store. If that buffer store is in the holding area it will be completely separated from the other areas of the site by means of close-boarded timber hoarding and weatherproof roof with a lockable door to be approved by the PIG-ES. Alternatively it may consist of a lockable transportable container outside the segregated or holding area. In either case the location is to be agreed on site as above. If this area is outdoors, it will be made weather-proof by construction of a sloping waterproof roof. This storage area will be sufficient to hold all asbestos contaminated waste arising from the works in hand at any given time with location to be arranged on site.

F. Water for the Works

63. If the CONTRACTOR considers that the “on-site” water supply is either insufficient or not suitable, he will make alternative arrangements for providing an adequate water supply and pay all charges in connection therewith. If the CONTRACTOR is to provide its own supply, it will be necessary to demonstrate to the satisfaction of the PIG-ES that the method provides sufficient supply for all its requirements. The CONTRACTOR will provide for the Works all temporary storage, connections, distribution pipe work and clear away upon completion.

64.

4.5 Procedures for Removal Asbestos Drainage and Irrigation Pipes

A. Essential Rules and Actions

65. Asbestos cement pipes in packs (wrapped) will not be placed in the site or Buffer Store without being labelled and numbered and entered in the ACM register. Consignments of asbestos cement pipes will not be removed from the Buffer Store without permission for disposal and completed details for disposal site with number entered in the ACM register by the PIG-ES.

66. A temporary Buffer Store (Segregated Works Area(s)) will be identified to receive wrapped asbestos cement pipe packs and bags to await disposal. All wrapped asbestos cement pipes / packs will remain on the site in the Buffer Store until permission and location for disposal has been given by the authorities and otherwise will not be removed.

67. TAWs will put on PPE and receive a toolbox talk from the TAS about the work tasks to be completed and the order of work (details prescribed below).

68. Any loose pieces of asbestos cement pipes will be picked up and stored in plastic bags or barrels and sealed and placed in the Holding Area (**Figure 4-1**). Non asbestos loose debris and rubble will be removed to create a flat segregated work area.

69. A level area of ground immediately beside the buried asbestos cement pipes (**Figure 4-1**) will be set aside as a Segregated Works Area. This Area will be covered by a double layer of 0.15mm polythene sheeting and secured in place with soil pegs/nails, then duct tape up to a width of 2m on one side (where the asbestos cement pipes will be removed).

70. The TAS and PIG-ES will carry out joint visual inspection of the preparation to check that the preparation has been carried out satisfactorily and instruct and issue a written certification to the Contractor to proceed (Appendix C and Appendix D).

B. Abatement Method

71. The principle will be that fixed pieces of asbestos cement pipes to be removed will be carefully separated at the joints (not cut) from the ACM pipes to remain in place. They will be carefully excavated, brought to ground level, wrapped in polythene and stored. The process will be overseen by the designated TAS. PIG-ES will also observe.

72. Workers handling the asbestos cement pipes will wear PPE (**Table 4-1**) including approved half face N95 masks, protective coverall and gloves.

73. Before commencing with the removal, any exposed existing asbestos cement pipes will be sprayed with water containing a wetting agent (**Table 4-1**) to reduce fiber release. The wetting agent will be of a correct mix and concentration in accordance with the manufacturer’s instructions as specified under materials below.

74. The solution will be sprayed using airless spray equipment capable of providing a ‘mist’ application to reduce the release of fibers. The existing asbestos material will be sufficiently saturated to

wet it thoroughly. The existing asbestos material will be sprayed repeatedly during the removal processes to maintain a wet condition and to minimize asbestos fiber dispersion.

75. The ACM pipes must be carefully excavated. The access trench will be cautiously excavated without cracking or breaking or damaging the ACM pipes any further than they are already broken. Manual digging (using shovels) is preferred for shallow buried pipes and exposed ACM nearer the surface and at exposed end pipes. A mechanical digger / backhoe may be used for the initial excavation of trenches above deeper buried pipes. After excavation to within 15 cm of the buried ACM pipes, the final excavation will be manual to avoid unnecessary damage to the pipes. The remainder of excavation to full depth to expose the underside of the ACM pipes will be by hand and shovel, as much as possible not to break the ACM pipes before disconnection and removal. The ACM pipe to be removed will then be carefully separated from the connecting telescopic joints of the pipes to remain in place pipes at either end or lifted from the trench in the following way (**Figure 4-1**).

76. The fixed ACM pipes will be carefully excavated in short sections one by one and prized from the surrounding earth and separated from any attached ACM pipes to remain in place. After wrapping, taking care not to unnecessarily drop, crack, break or damage the ACM pipes, ACM pipes will be taken up to ground level in manageable sections. POWERED MECHANICAL EQUIPMENT WILL NOT BE USED TO CUT OR SEPARATE THE ASBESTOS PIPES. A mechanical hoist with sling can be used to lift the pipes to ground level.

77. Polythene sheeting will be passed under and wrapped around the whole length of the pipe to be removed and secured in place before lifting. The polythene sheeting will be cut on site to fit the pipe section being handled with enough overlap at the ends to enable the polythene to be tucked into the pipe ends. The polythene will be tightened around the pipe and kept in place during lifting using adhesive spray and duct tape. The polythene will be tucked into the pipe at each end. The lifting sling will then be passed around the pipe or through the pipe. When lifted to the surface, the ACM pipe package will be carefully laid on a second sheet of polythene with enough overlap at the ends to enable sealing and also fixed in place with adhesive spray and duct tape. The double wrapped ACM package will be wet wiped clean and sprayed with dyed Lock-Down (Appendix A2).

78. Smaller pieces of broken cement pipes in or on the ground will be sprayed with amended water and immediately picked up and put in polythene bags or be wrapped in two layers of polythene. The double bagged ACM package will be goose neck tied and the polythene will be wet wiped clean and sprayed with dyed Lock-Down.

79. The ACM pipe packages, or double bags will then be labelled with the labels fixed in place with adhesive spray and duct tape. If the labels are detached at any time, they will immediately be reaffixed with duct tape. The package will be numbered, and its contents recorded. The number will be noted and recorded and entered in the Trip Ticket Register (record book) by the TAS. The package including label number will be clearly photographed by the TAS and be moved to the Holding Area awaiting removal to the storage or disposal facility. An inventory of ACM pipe packages in the Holding Area awaiting removal will be updated on a daily basis by the site supervisor.

80. All wrapped asbestos cement pipe packs and bags will be transferred to the temporary Buffer Store (Segregated Works Area) at the end if the shift to await disposal in the approved manner.

81. The operatives will then properly decontaminate tools and equipment by wet wiping to remove any trace of asbestos. The operatives will then wet wipe their face, head and overalls clean before removing face masks and overalls. Surplus adhesive tapes, wet wipes, face masks and overalls will then immediately be double bagged and goose neck tied and the bags and area wet wiped with wipes disposed of as ACM waste.

82. The TAS will then carry out a visual inspection and sign to certify that all visible asbestos cement pipes and broken pieces have been removed and that asbestos cement pipe packs and bags have been

counted, labelled, numbered entered in the Trip Ticket Register and transferred to the segregated temporary Buffer Store to await disposal. If the visual inspection indicates a satisfactory standard all polythene sheeting covering the segregated and holding area will be picked up, rolled, wrapped and bagged as above and labelled, numbered and a record entered in the Trip Ticket Register by the TAS.

83. The PIG-ES will then carry out a reassurance visual inspection to certify that all remaining polythene sheeting and equipment and visible asbestos has been removed to a satisfactory standard and proper decontamination of tools and equipment has taken place. The PIG-ES will then check all bagged ACM has been numbered and a record entered in the Trip Ticket Register by the TAS.

84. The PIG-ES will double check and record the number of packs of waste in the Buffer Store on a weekly basis and sign Trip Ticket Register awaiting disposal and Trip Tickets in due course before disposal commences.

C. Trip Ticket system and ACM Disposal (Option 1)

85. The Trip-Ticket system (in triplicate) will ensure recording of orderly disposal of every consignment of ACM waste to the approved disposal facilities by trucks. The TAS and Contractor / Driver are required to complete a standard Trip-Ticket form (triplicate) outlining transportation vehicle registration number, ACM waste being carried (numbers of packs and approximate volume) and the approved disposal facility. The Trip-Ticket will also be signed by the Agent at the approved disposal facilities when ACM is received.

86. First copy to be signed by the PIG-ES and TAS to confirm the details of the consignment and entered in the Trip Ticket Register.

87. Second copy to be signed by the TAS and Driver to confirm the consignment has been removed from the Buffer Store and is on the designated truck and that the driver understands the waste is to be delivered to the approved disposal facility and the route. Transportation will take place same day. PIG-ES may wish to accompany the consignment to the disposal. Second copy to be signed by the Driver and the Agent at the approved disposal facilities when ACM is received. The signed second copy will be retained by the Driver as proof of delivery and to support payment. The second copy will be returned to the PIG-ES / TAS by the Driver to confirm the details of the disposal and entered in the Trip Ticket Register.

88. Third copy to be signed by the Agent at the approved disposal facilities when ACM is received for disposal. The driver will sign that the consignment has been removed from the designated truck and that the driver has delivered the ACM waste to the Agent at the disposal facility. Third copy to be signed by the Driver and the Agent at the approved disposal facilities and retained by the Agent for later checking of disposal by PIG-ES and authorities as necessary.

89. The PIG-ES and TAS will check and resolve all trip tickets with the reception facility on a monthly basis to ensure no ACM waste is mislaid.

90. The implementation of such a system will ensure an acceptable level of accountability between the project proponent, engineer/architect and the contractor. Moreover, it facilitates the recording of waste as it arrives at the disposal facility and minimize the potential for cross-contamination with other waste which the vehicle operator may otherwise likely pick-up and route to the disposal facility. This system assumes that the Contractor will bear the responsibility for segregation and storage of the ACM waste generated on their site prior to its disposal and subsequently transport and disposal. The system is verifiable.

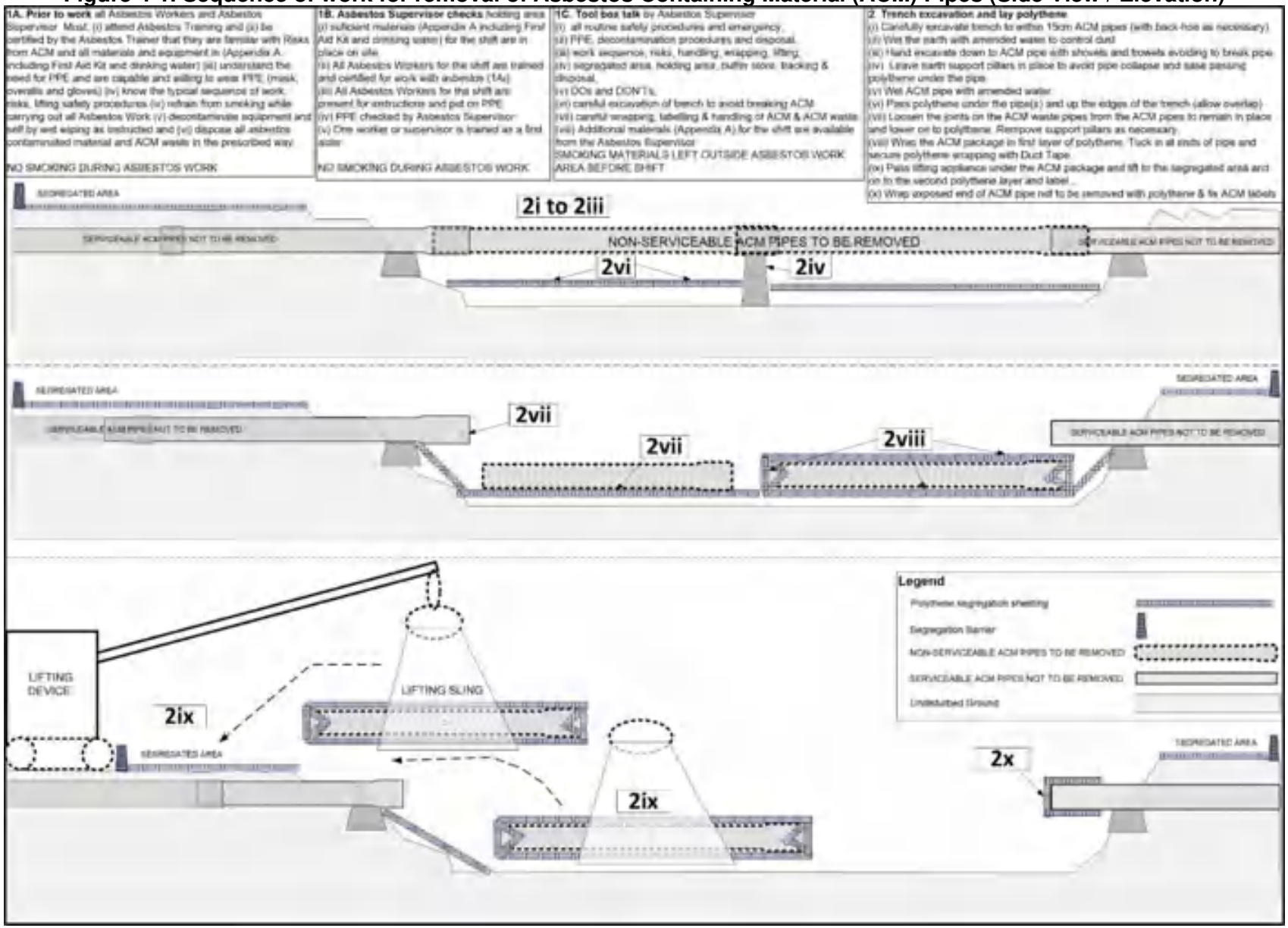
D. Alternative to Trip Ticket system for ACM Disposal (Option 2)

91. The above Trip Ticket System is recommended. However In the event that this cannot be implemented the following alternative will be deemed equivalent.

92. The trained PIG-ES and TAS will confirm the details of the ACM waste consignment and entered in the ACM Register. The PIG-ES and TAS will sign the ACM Register to confirm the consignment has been removed from the Buffer Store and is on the designated truck and that the driver understands the waste is to be delivered to the approved disposal facility and the route.

93. The PIG-ES will accompany the Driver in the truck with the ACM waste consignment to observe delivery of all consignments to the designated disposal area. The PIG-ES will take photographs of the truck with consignment at the Buffer Store and also at the designated disposal facility to prove that all of the ACM waste consignment has been removed from the truck and is delivered correctly to the approved disposal facility. Pick up from Buffer store and transportation to the disposal area will take place on the same day. The photographs and written records will be entered in the ACM Register by the PIG-ES to confirm the details of the disposal and entered in the Trip Ticket Register.

Figure 4-1. Sequence of work for removal of Asbestos Containing Material (ACM) Pipes (Side View / Elevation)



5. Asbestos waste arising and disposal

5.1 Quantity of Asbestos Containing Material (ACM) Waste

94. **Table 3-1** presents a broad-brush format for estimating quantities of waste that will be identified for disposal. Based on the hazard assessment, the conclusion of the investigation so far is that Type 1 ACM is present in the pipes and there is a possibility of more ACM in other parts of the system.

95. The total quantity of waste for disposal cannot be estimated at this time and will be updated in the AMP at the detailed design stage. The majority of waste will arise in the form of ACM cement pipes.

96. In addition to the actual ACM to be removed, there will be waste plastic and other materials that were used to create segregation for work with low-risk materials. The total volume of potential ACM asbestos contaminated waste arising from the various processes is significant and will be estimated during the detailed design stage.

97. At this stage it is not possible to determine exactly the program for the waste arising. A detailed program will be prepared in the detailed design stage.

5.2 Packing and Storage of Asbestos Containing Material Waste

98. Waste will be packed in plastic bags or wrapped in polythene sheeting in line with the procedures specified in Chapter 4 above. Bags of waste will be gooseneck tied and other packages of ACM waste pipes will be double wrapped with polythene. The outer second bag will also be cleaned before removal from the Segregated Works Area. The cleaned sealed bags will be placed in the designated holding area (buffer store) to await transportation to the designated disposal site. Packages of wrapped waste will be carefully stacked no more than two high, to avoid risk of puncturing and spillage of contaminated waste.

99. All sealed packages containing asbestos waste will be clearly labelled (Appendix A) with labels attached with duct tape. Waste will be held on site in the designated buffer store. The location of the buffer store will be worked out in liaison with ALRI/PIG/WUA/PIC and the TAS to the satisfaction of ALRI/WUA.

100. Storage of double-bagged contaminated waste will be either in such as a designated buffer store area within a building or in locked transportable containers outside the contaminated works area(s), with either location to be agreed on site. This could be enclosed within the Controlled Works Area,[73] but it will be completely separated from the other areas inside the site by means of close-boarded timber hoarding with a lockable door to be approved by the PIG-ES.

5.3 Transportation of Waste and Contingency Measures

101. Waste transportation will be carried out in line with the requirements of the local environmental authority regulations. In particular a trip ticket system for the tracking of waste (“cradle to grave”) and other contingency measures will be adopted in line with best international practice.

102. A carting company experienced or at least capable of transporting the contaminated waste without damaging it or causing release of ACM waste will be used by the CONTRACTOR to transport asbestos contaminated waste to the disposal site, which is designated by the local environmental authority.

103. The PIG-ES will estimate the quantities of waste for disposal in conjunction with the TAS and ALRI and apply to the local environmental authority for permission to dispose well in advance in order to avoid the unnecessary accumulation of waste on site.

5.4 Disposal Site

104. Vakhsh landfill has been identified for the disposal of ACM waste. The site is monitored by the Committee on Environmental Pollution (CEP) as one of the candidate sites for the ACM disposal. This

[73] See footnote 72.

landfill has an area of about 12 hectares and is located about 17km from the nearest point on the Vakhsh irrigation canal to the southeast from the Project area. It is functioning as of 2020 and is being used for the different types of hazardous waste, including ACM waste.[74] But at the detailed design stage, PIG will further coordinate with the CEP to explore other candidate disposal sites as well to identify the most appropriate option.

6. Procedures for Emergency and Fire

6.1 General Provisions

105. The nature of the site is such that explosion or fires are unlikely. There is no local fire suppression system although water is available on site.

106. In the event of any fire or emergency or extraordinary operational reasons ALRI/PIG/WUA may require the normal condition of the site to be interrupted. In this case procedures will be governed by ALRI/PIG/WUAs in-house safety procedures.

107. In such cases ALRI/PIG/WUA or the CONTRACTOR will notify the PIG-ES immediately of any requirements and the PIG-ES will determine if the interruption to normal procedures will require that abatement works be temporarily suspended. If work is to be suspended, Segregated Works Area(s) will be temporarily vacated. During the call-off period, the CONTRACTOR/ TAS will conduct twice daily checks on the integrity of the containment(s).

108. If unexpected snowstorms or heavy rainstorms affect the abatement processes, the contingency procedures for such events will be that the PIG-ES will determine if the interruption to normal procedures will require that abatement works be temporarily suspended and operate the same call-off procedure as above.

109. Vandalism is not likely to affect the abatement processes due to the presence of the Contractor's watchmen on a 24-hour basis.

110. The water supply to the premises is peripheral to the site and burst pipes would not be likely to affect the abatement processes. Water from such sources would however be available to be piped to the abatement works for convenience.

6.2 Fire

111. The ACM waste buffer store will be located and designed so as not to block means of escape. Means of escape will be clearly indicated. The TAS will include fire prevention and no smoking rules in the toolbox talk convened by the TAS at the start of the program of works which highlights the provisions in the case of fire.

112. There will be no smoking on the Premises and means of ignition will not need to be brought into the controlled works.

113. The CONTRACTOR will establish to the PIG-ES's satisfaction evacuation procedures for emergency and/or fire. In the event of a fire, the PIG/TAS will assess the actual site situation after the event and determine the abatement method prior to any further abatement work being performed.

114. The CONTRACTOR will provide (minimum) one 5 kg dry powder extinguisher kept in the Segregated Works Area(s). The fire extinguisher will be decontaminated with other tools and equipment used in the containment at the end of the abatement process.

[74] source: Environmental Performance Review report, UNECE (2017)

7. Operation and maintenance plan (AOMP)

7.1 Deferred Asbestos Containing Material abatement and removal

115. Asbestos abatement work can be deferred when the exposure risk is considered negligible or the ACM is well-protected so that fiber release is very unlikely (Appendix B). However, a continuing effort in the form of an AOMP will be set up to monitor the situation by regular surveillance to make sure no disturbance will be made to the ACM during normal use, repair or refurbishment, and to lay down a course of action in case deterioration or accidental of the ACM is observed. This might occur due to an earthquake or unpredicted heavy rain that might erode the ground and expose or break pipes.

116. As the years go by, the potential for exposure may increase and the operation and maintenance (O&M) management system are required to establish the necessary precautions to prevent damage during maintenance and cleaning of pipes. A rolling program of inspection and re-evaluation is necessary for the life of the project. ALRI/PIG may elect to remove other sections of the ACM pipes in future and in those cases the AMP methodologies will apply whether or not under the Project as these are associated works under ADB requirements. The methods of removal are prescribed in Chapter 4 of this AMP.

7.2 Policy of ALRI on operation and maintenance for Asbestos Containing Material not to be removed

117. For ACM not to be removed, the policy of ALRI is to make available and understood by all personnel involved the following planned objectives for O&M and the procedures set out in the work practices to:

i. maintain the ACM pipes and suspect ACM material in good condition;
ii. ensure proper clean-up of asbestos debris and fibres previously released;
iii. prevent further release of asbestos fibres;
iv. monitor the condition of ACM and any suspect material; and
v. safely handle accidental release of asbestos debris and fibres.

118. The procedures are tailored for the Project site and will be regularly updated in response to any unexpected events or discovery of ACM not identified in this AMP.

7.3 Operations and Maintenance Plan (AOMP) for Asbestos Containing Material not to be removed

119. The AOMP will include the following information A to K as a minimum. The AOMP can be consolidated when there are more details of proposed management practices and included in the updated AMP at the detailed design stage.

A. ACM O&M Register: Detailed descriptions of Site, facilities, and ACM components

120. This includes detailed description of the location, age, structure, occupancy, usage pattern and main activities of the sites and brief description of the neighborhood in terms of their occupancy and activities. This information will be available at the detailed designs stage. All ACM components and locations and conditions and any on-going O&M actions will be recorded in writing in an O&M Register, updated at least quarterly.

B. Organization of people for implementing the operation and maintenance plan (AOMP)

121. An organization chart will be prepared showing the administrative line of authority (with names and positions) and defining the responsibilities of key participants such as the responsible owner ALRI/PIG/WUAs, the TAS / IES, custodial and maintenance supervisors and staff and the training records for named TAWs.

C. Detailed locations of identified ACM and suspect material

122. The O&M Register will include the characteristics, type, quantity and physical condition of all identified ACM and suspect materials (Similar to **Table 2-1** and **Table 3-1**) after the asbestos investigation has been completed. Information will be presented in a tabulated form. All ACM and suspect materials will be depicted clearly on layout plans or sketches to indicate their exact locations (e.g. **Figure 2-1**) with GPS coordinates if possible.

D. Condition of the identified asbestos containing material and suspect material:

123. The O&M Register will also include descriptions of the condition of all identified ACM and suspect materials (similar to **Table 3-1**) and a detailed account of any damaged material with dimensions, potential for further damage (air quality measurements if appropriate). Any clean-up of previously released ACM will be described in detail.[75]

E. Reasons why any asbestos containing material should not be removed

124. In-situ ACM or suspect material can often be left in place and effectively managed but the reasons for adopting the other asbestos abatement methods such as deferred action will be provided in the O&M Register. Such reasons should be based on the findings of the investigation, location, and condition of the ACM, updated as necessary.

F. Method of labelling the asbestos containing material

125. All identified ACM not requiring removal will be labelled (the specification for the label is given in Appendix A). Details of the method of labelling and maintenance of labels will be provided in the O&M Register. Labels will be affixed to ACM so they will not detach. Corresponding photographs and ACM location number will all be recorded in the inventory in the ACM O&M Register.

G. Method of informing all people who may be affected

126. Workers, tenants, farmers, and other users of the site will be informed of the location and physical condition of the ACM which they might disturb, and to encourage them to report any evidence of disturbance or damage of ACM to the owner for corrective action. Any communications to that effect will be recorded in detail in the ACM O&M Register.

H. Surveillance scheme

127. A PIG-ES or responsible ALRI staff with training in asbestos management (Appendix E) will be appointed to carry out a comprehensive re-inspection of all the ACM and suspect materials at least once every two years.[76] The ACM O&M Register will include a compilation of color photos on the condition of the material over time. If updated say every year this can be of great value to identify deterioration, especially if there are changes of staff. Details of a surveillance scheme to that effect will be provided in the ACM O&M Register.

I. Method to avoid disturbing the asbestos containing material:

128. Workers, farmers, WUAs and ALRI and other users of the Site will be encouraged to notify the owner (ALRI) of even small, planned maintenance and renovation before any work is carried out. In addition, an authorization system will be adopted to:

i. monitor any O&M activities;
ii. prevent accidental disturbances of ACM or suspect material; and
iii. prohibit the introduction of new ACM.

---

[75] In this case it is unlikely but if damaged ACM is located in the path of natural or artificial ventilation which may cause fibers to be transported, the clean-up may need to be extended to a wider area, including possibly the ventilation system itself.

[76] Whereas a carefully designed program of airborne asbestos fiber monitoring may be useful to give early warning of deterioration or disturbance of ACM, this is not appropriate unless high risk materials are identified at a later stage.

129. Sample forms for permission to work are given in Appendix C and Appendix D for reference. Details for administration of such a notification and authorization system will be provided in the ACM O&M Register.

J. Record keeping scheme:

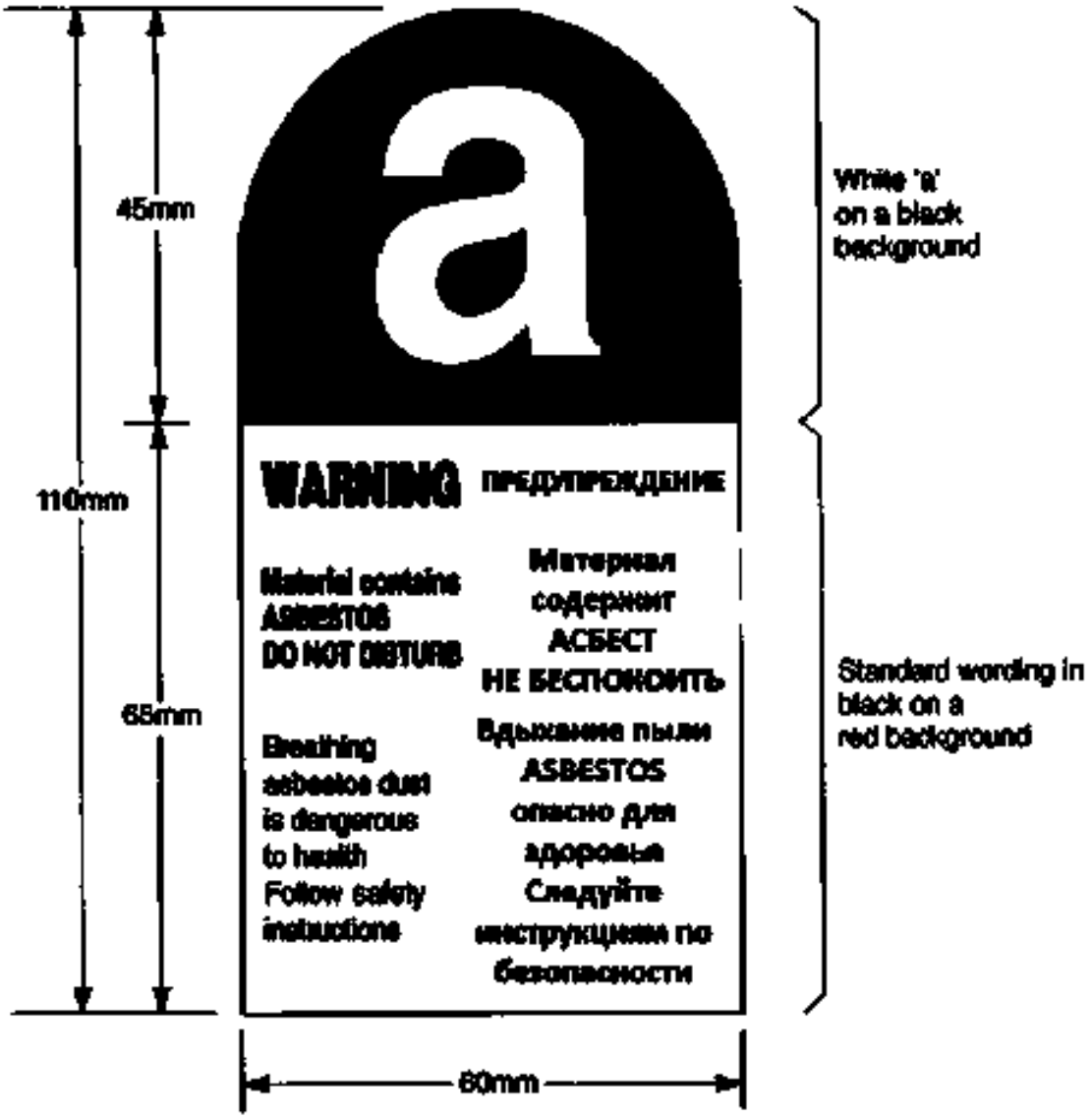
130. Details of a record keeping scheme (the ACM O&M Register) for all asbestos management documents will include investigation and assessment reports, AOMP, policies and work procedures, workers training and medical records, fiber release reports, airborne fiber monitoring reports, maintenance and renovation notifications, authorizations issued, evaluation of work affecting ACM and re-inspection and surveillance of ACM.

K. Actions for handling deteriorating asbestos containing material:

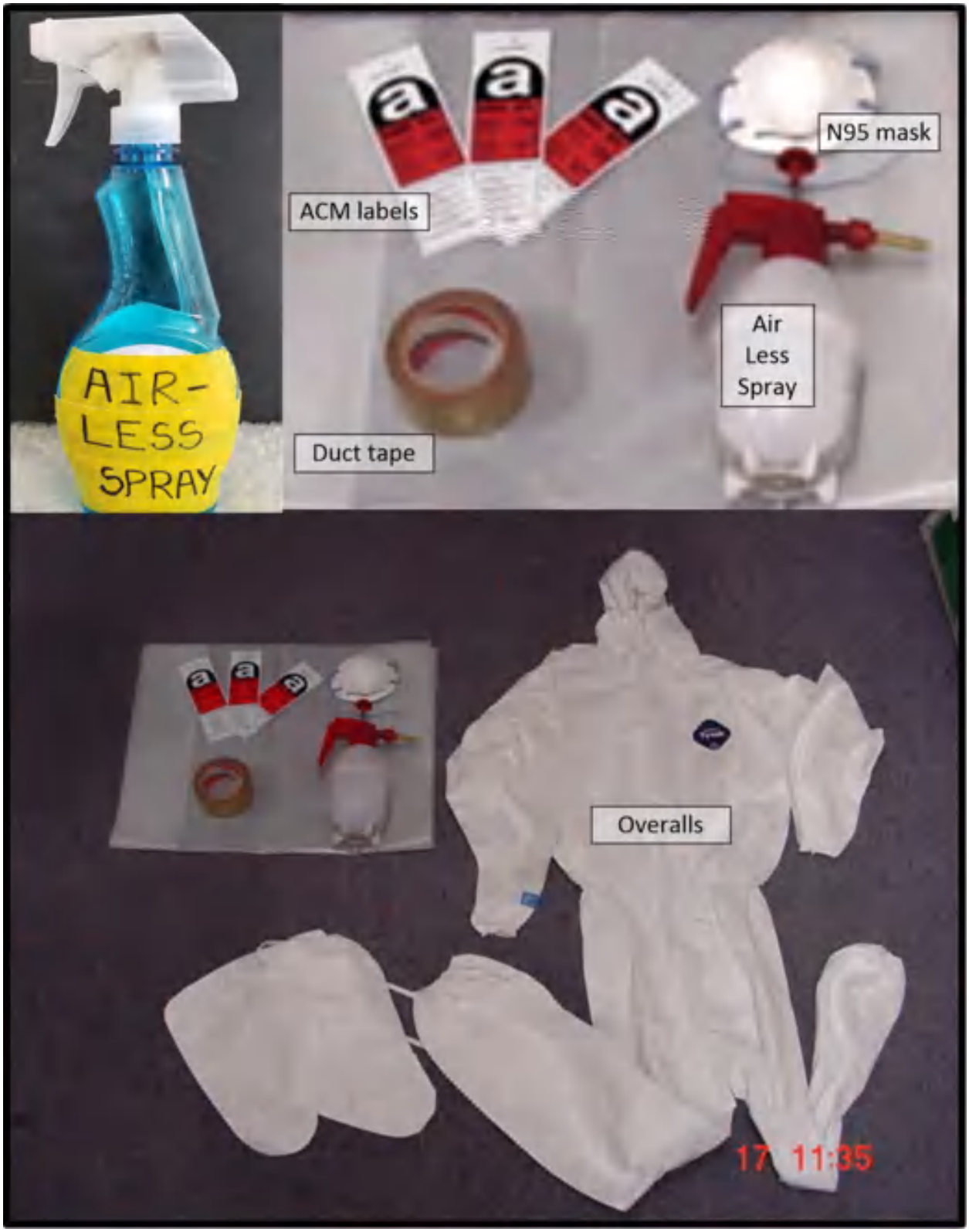
131. Special O&M practices for handling deteriorating ACM as well as under what circumstances a major clean-up operation would be required, will be fully explained. The presumption is that all ACM to be removed will use the methods prescribed in this AMP for the life of the Project.

Appendix A ACM Label and Personal Protective Equipment

Appendix A1. Label for ACM or Suspected ACM



Appendix A2. PPE and Air Less Sprayer alternatives



Appendix B Advantages, Disadvantages and Criteria for Asbestos Abatement Methods

Appendix B1. Advantages and Disadvantages of Asbestos Abatement Methods

Asbestos Abatement Method	Advantages	Disadvantages
Removal	- Asbestos source eliminated. - No further action required.	- Often highest cost, most complex and time-consuming method. - Removal creates major disturbance, Possible increase fine risk within site. - Possible contamination of whole site if removal poorly done / not effective. - Higher potential for worker exposure. - Substitute material required.
Encapsulation **(NOT APPROPRIATE IN THIS PROJECT #)**	- Usually a quick and economical method for repair to damaged areas. - May be an adequate technique to control release of asbestos dust.	- Asbestos source remains. - If material is damaged or deteriorating, additional weight of the sealant may cause delamination. (NOT APPROPRIATE IN THIS PROJECT) - Cost for large areas may be near removal cost. - Management system required. Check regularly damage to encapsulated ACM. - Eventual removal may be more difficult and costly.
Enclosure **(NOT APPROPRIATE IN THIS PROJECT #)**	- May be an adequate method of control for some situations. - May minimise disturbance to exposed population.	- Asbestos source remains and fibre fallout continues behind enclosure. - Management system required to provide continuous maintenance to enclosure. - May be costly in enclosure disturbs functions or requires relocation of other systems. (NOT APPROPRIATE IN THIS PROJECT) - Precautions necessary for entry into enclosure for maintenance or renovation. - Need to remove enclosure before eventual removal of asbestos.
Deferred Action	- No initial cost.	- Potential for exposure may increase with time. - Management system required. - Precautions necessary to prevent damage during maintenance or renovation. - Continuing inspection and re-evaluation necessary.

Not appropriate for the ACM pipes so far identified

Appendix B2. Criteria for Choosing an Appropriate Asbestos Abatement Method

Asbestos Abatement Method	When Appropriate	When Not Appropriate
Removal	- Material severely damaged or liable to further deterioration. - Material friable or poorly bonded to substrate. - Prior to replacement, renovation, or demolition.	- Material located on complex and inaccessible places. - Removal extremely difficult and other techniques offer better alternative.
Encapsulation (NOT APPROPRIATE IN THIS PROJECT#)	- Removal not feasible. - Material still remains firm bonding to substrate. - Damage to material unlikely. - Limited accessibility of material. - Short remaining life of structure. - Economic or time advantage.	- Material does not adhere well to substrate. - Weight of sealant may cause delamination - Material is deteriorating or damaged. - Water damage likely. - Continuing inspection and maintenance of encapsulated material doubtful.
Enclosure (NOT APPROPRIATE IN THIS PROJECT#)	- Removal not feasible. - Fibres can be completely contained with enclosure. - Disturbance or entry into enclosed area unlikely. - Economic advantage.	- Damaged or deteriorating material causing high levels of fibre fallout. - Water damage likely. - Damage to enclosure likely. - Entry into enclosure probable for repairs and maintenance. - Continuing inspection and maintenance of enclosure doubtful.
Deferred Action	- Negligible exposure potential. - Material inaccessible and fully contained. - Material in stable condition and not liable to damage.	- Definite or questionable exposure potential. - Possibility of deterioration or damage. - Continuing inspection doubtful.

Not appropriate for the ACM pipes so far identified

Appendix B3. Methods of dust suppression in Asbestos Abatement

The following methods of dust suppression will be adopted as far as practicable in asbestos abatement activities.

- Containment or segregation of work area.
- Wetting of ACM before and during disturbance, using amended water where appropriate.
- Minimising the breakage and dropping of ACM and packing of debris and waste immediately after it is produced.
- Cleaning of work area by wet wiping.
- Proper bagging, handling and disposal of asbestos waste or asbestos-contaminated waste.
- Coating on any surfaces previously in contact with or contaminated by asbestos with a proper sealant.
- Decontamination facilities with copious water and wet wipes available for cleaning of workers before leaving the work area.
- Decontamination facilities with copious water available for cleaning bagged waste and equipment before leaving the work area.

Other methods are commonly used but at this stage do not appear necessary to the Project

- Use of negative pressure equipment with HEPA filters to control air flow between the work area and the outside environment.
- Enclosed decontamination facilities with showers with HEPA filters to control air flow for cleaning or workers, and equipment and bagged waste before leaving the work area.
- Cleaning of work area by vacuuming with HEPA-filtered vacuum cleaner.

Appendix C Application and Permission forms for Maintenance or Renovation Work

Appendix C1. Application Form for Maintenance or Renovation Work

HE	Application Form for Maintenance or Renovation Work
HT	*Форма заявки на техническое обслуживание или ремонтные работы*
E1	Requirement for permission from
T1	*Требование разрешения от*
E2	Person-in-charge of work:
T2	*Ответственное лицо за работу*
E3	Telephone Number:
T3	*Номер телефона*
E4	Commencement Date:
T4	*Дата начала:*
E5	Completion Date:
T5	*Дата завершения*
E6	Location of Site where work is to be performed (with GPS if possible) :
T6	*Местоположение участка, на котором будут проводиться работы (по возможности с помощью GPS)*
E7	Description of work:
T7	*Описание работы:*
E8	Description of any asbestos-containing material that might be affected or used, if known (including location and type):
T8	*Описание любого асбестосодержащего материала, который может быть затронут или использован, если он известен (включая местонахождение и тип):*
E9	Name and telephone number of applicant:
T9	*Имя и телефон заявителя*
E10	Address:
T10	*Адрес:*
E11	Signature:
T11	*Подпись*
E12	Date:
T12	*Дата:*
E13	NOTE: An application must be submitted for all maintenance or renovation work whether or not asbestos-containing material might be affected. An authorization must then be received before any work can proceed.
T13	*ПРИМЕЧАНИЕ: необходимо подавать заявку на все работы по техническому обслуживанию или ремонту, независимо от того, могут ли они затронуты асбестосодержащие материалы. Затем необходимо получить разрешение, прежде чем можно будет продолжить работу.*

Appendix C2. Permission Form for Maintenance or Renovation Work

E1	Granted (Application Number:)
T1	*Разрешено (номер заявки)*
E2	With Condition*
T2	*С условием * *
E3	Denied
T3	*Отклонен*
E4	*Conditions:
T4	** Условия:*
E5	Remarks (Follow-up visit and observations) :
T5	*Примечания (Контрольный визит и наблюдения):*
E6	Signed (Project Implementation Consultant's international environmental specialist/ALRI):
T6	*Подписано (международный специалист по окружающей среде Консультанта по реализации проекта / ALRI)*
E7	Date:
T7	*Дата:*

Appendix D Authorization Form for Maintenance or Renovation Work

HE	Authorization form for maintenance or renovation work
HT	*Форма разрешения на работы по техническому обслуживанию или ремонту*
TE	Authorization
TT	*Авторизация*
E1	Authorization is given to _____ (Person-in-charge of work) to proceed with the following maintenance or renovation work at the specified location:
T2	_____ (*Ответственное* за работы лицо) дается разрешение на выполнение следующих работ по техническому обслуживанию или ремонту в указанном месте:
E3	This authorization will expire at _____ hours on _____.
T3	Это разрешение *истечет* в _____ часов _____.
TE	Presence of Asbestos-Containing Materials
TT	Наличие *асбестосодержащих* материалов
E1	Asbestos-containing materials (ACM) not present in the vicinity of the maintenance/renovation work.
T1	Асбестосодержащие материалы (ACM) не присутствуют в *непосредственной* близости от места проведения ремонтных работ.
E2	ACM is present, but its disturbance is not anticipated, however, if conditions change, the registered asbestos consultant will re-evaluate the work request prior to proceeding.
T2	ACM присутствует, но его нарушение не ожидается, однако, если *условия* изменятся, зарегистрированный консультант по асбесту повторно оценит запрос на работу, прежде чем продолжить.
E3	ACM is present and may be disturbed.
T3	ACM *присутствует*, и его можно беспокоить
TE	Work Practices if Asbestos-Containing Materials are Present
TT	Порядок работы при *наличии* асбестосодержащих материалов
E1	The following work practices will be employed to avoid or minimize disturbing asbestos:
T1	Следующие методы работы должны использоваться, чтобы избежать или минимизировать вредный асбест:
TE	Personal Protection if Asbestos-Containing Materials are Present
TT	Личная *защита* при наличии асбестосодержащих материалов
E1	The following equipment/clothes will be used/worn during the work to protect workers:
T1	Следующее оборудование / одежду следует использовать / носить во время работы для защиты *рабочих*:
E2	Special Practices and/or Equipment Required
T2	Особые методы и / или необходимое оборудование
E3	Signed (Trained Asbestos Supervisor):
T3	Подпись (обученный консультант по асбесту):
E4	Date:
T4	*Дата*:

Appendix E Overview of Asbestos Awareness Training

TOR for Asbestos Awareness and Training for Asbestos Workers and Supervisors and other such professionals for work with Low-Risk ACM irrigation and drainage pipes.

A. It has been known for more than 50 years that exposure to asbestos can cause serious diseases including cancer and asbestosis. The work for the Project is low risk but it is important that the dangers of asbestos are understood by all those who may come in contact with it. With systems put in place to prevent or reduce exposure, the training will enhance the knowledge of occupational hygiene practice in relation to asbestos and the health and safety practices required for the Project works. The training will give an understanding of the health risks associated with asbestos and other fibers in the context of the work expected as well as the means of evaluation and control.

B. Low risk asbestos work does not generally require to be licensed in most countries but is usually classified as involving directly working with or disturbing asbestos-containing materials in some capacity, which means workers need a higher level of information, instruction, and training than what is given in simple awareness training.

C. Low risk asbestos work training under the AMP for the Project will prepare; (i) Trained Asbestos Workers (TAWs); (ii) Trained Asbestos Supervisor (TAS); and (iii) nominated staff from PIG (including at least PIG-ES), ALRI and WUAs to respectively; (a) carry out, (b) supervise, and (c) superintend work with low-risk ACM pipes and to do so safely if they must work with or disturb asbestos. The job roles and responsibilities for the PIG-ES, TAW and TAS and other professionals will be clearly defined.

D. This will cover control measures for minimizing risks, safe work methods, understanding risk assessments, PPE, waste handling, and emergency procedures. It should also cover circumstances when low risk work becomes high risk such as if ACM is mishandled or cut with power tools.

E. The job roles and responsibilities for the TAW and TAS asbestos training are more developed than those for simpler awareness, but with the added criteria that their work directly involves ACM or will disturb asbestos. An example of work activities that fall into this category specifically includes cleaning or repairing or removing asbestos cement pipes under the AMP.

F. More complex activities that are not considered low risk will need a higher level of training to cover all the risks involved in the higher risk work. However, this is not expected at this stage. A more detailed risk assessment will be required when the AMP is updated at the detailed design stage. The employer (ALRI/PIG and IES) will do this by carrying out ACM bulk analysis on representative samples and updating the AMP including the risk assessment. For instance, the work requires removing asbestos-containing materials, however if it turns out they are in poor condition or have a high friability, the risk will be higher and the AMP must be updated accordingly including details of the higher level of training, if required.

G. Attendees will understand the health hazards of exposure to asbestos, how exposure can occur and how these risks can be managed. With asbestos awareness provided, attendees will be equipped with the basic knowledge and considerations for safe planning of work.

H. The professionals and workers who are involved in refurbishment and removal works, service and maintenance staff, engineers, and construction workers, surveyors, and other such professionals.

I. In outline the training will include: (i) understanding asbestos, (ii) dangers of asbestos, (iii). health risks of ACM, (iv) legal requirements on asbestos, (v) asbestos risk assessment considerations, (vi) workplace procedures and safety, and (vii) Do's and Don'ts. Health professionals associated with implementation would also benefit from being made aware of; (a) hazards from asbestos and other fibrous materials, (b) health hazards and exposure limits, (c) asbestos in the Project area and surveys conducted, (d) summary analysis of bulk samples, and (e) workplace procedures and safety.

Appendix F Asbestos Awareness Training Providers (with online options)

SGS Singapore

https://www.sgs.com/en/news/2019/05/sgs-launches-free-asbestos-e-learning-training-course. **Free**

High Speed Training UK

https://www.highspeedtraining.co.uk/hub/three-types-of-asbestos-training/

https://www.highspeedtraining.co.uk/health-and-safety/online-asbestos-awareness-training.aspx **$25**

Institute of Medicine (IOM) Singapore Asbestos Awareness

https://www.iom-world.sg/media/106187/ASBESTOS_AWARENESS%20Brochure.pdf

https://www.iom-world.sg/media/106259/W504%20Brochure.pdf

IHASA (Canada)

https://www.ihsa.ca/Training/Courses/Asbestos-Abatement-Worker.aspx

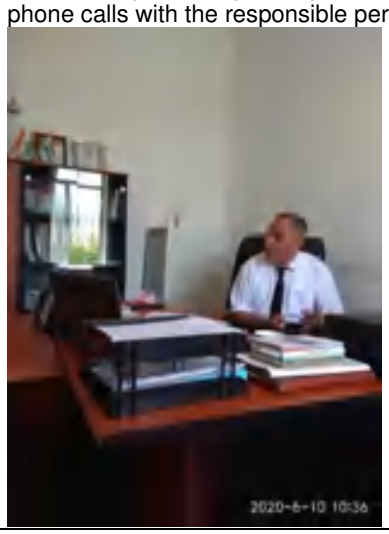
https://www.ihsa.ca/Training/Courses/Asbestos-Abatement-Supervisor.aspx

Annex 2. MINUTES OF CONSULTATION

A. Consultation meetings with government institutions

In phase 1 consultation, all interviewees were informed about the scale location and scope of the project. (Information was given on Preparation of the Project in Yovon, Khuroson and A. Jomi districts for the modernization of irrigation and drainage in the Vakhsh river basin through conversation, no information leaflets were prepared at this stage.) [information in square parentheses = post meeting note].

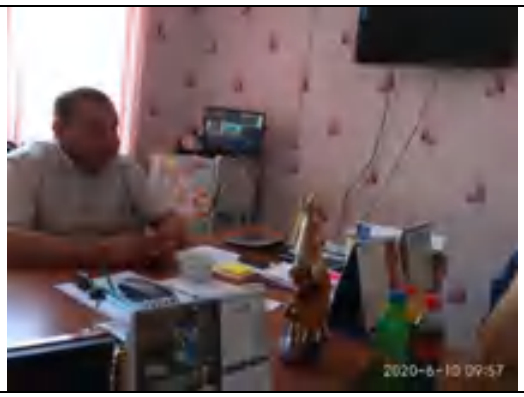
Interviewee No. 1

Name	Nabiev Askarbek Ashurovich: First Deputy Chairman of the Hukumat of Yovon district, Nabiev Askarbek Ashurovich - 901-32-75-75
Location	Tajikistan, Hukumat of Yovon district
Date	10 June 2020
Information	Environmental and social concern; He confirmed that Yovon district needs a new project that would improve the irrigation system of the district, which would help to increase agricultural productivity and improve living standards of the population, especially women who experience difficulties due to the high level of labor migration of the male population. He also helped in organizing a meeting with representatives of the LRID of the Yovon district by phone calls with the responsible persons.  

LRID = ALRI's district Land Reclamation and Irrigation Division

Interviewee No. 2

Name	Sharipov Ibodullo – 918-80-87-82. Head of the Department of Environmental Protection of the Yovon District
Location	Tajikistan, Department of EP of the Yovon District
Date	10 June 2020
Information	Caring for the environment, safety and social issues A conversation was held with him, he confirmed that the Yovon region is experiencing big problems associated with erosion and soil washout, as well as unauthorized dumps of household waste. He said that the Department of Environmental Protection of the Yovon District, together with the jamoat and the district's communal service, as well as educational institutions, often carry out measures on greening the district, clean up the district from garbage, clean up gutters clogged with garbage and clay and the banks of the Javansu river from garbage. On request to provide maps on geology, seismicity, climate, state and composition of soils, flora and fauna of the Yovon district, Mr. Sharipov replied that he does not have such information, he called for a representative of the Ministry of Emergency Situations and the Chief architect of the Yovon district. In addition to general information, no useful information was obtained (maps for the Yovon district: geology, seismicity, climate, state and composition of soils, flora and fauna, according to them, are not available).

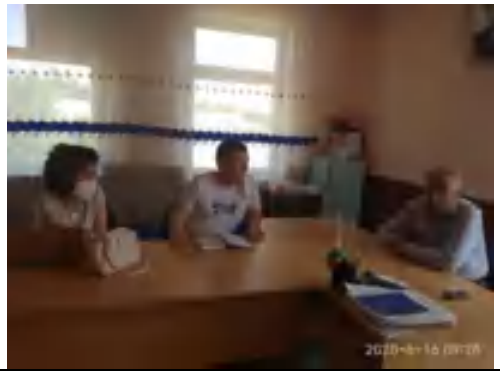
	

Interviewee No. 3

Name	Sangov Yormahmad - Chief Engineer of LRID, Yovon District– 935-79-41-46.
Location	LRID of Yovon District
Date	10 June 2020
Information	There is no particular concern for the environment. Unemployment [is a key issue]. Lack of technical capabilities [is another]. Unemployment and lack of technical capabilities are concerns for the operation and maintenance of the irrigation and drainage systems, The Chief engineer described the situation on the environmental state of the soils of the Yovon district. He told about the existing state of the drainage network, consisting of asbestos-cement pipes, in some sections the pipes and inspection wells are failed and clogged with debris. He said that it would be good if the Project provided with special machines for flushing drainage pipes under pressure of water pressure, so they could check on which areas there is a problem and the possibility of replacing the failed pipes in this area. Mr. Sangov provided archival materials related to geography, geology, seismology, etc.). (photographed, then transcribed from the photographs into the report) Existing maps are available only in paper form, based on old data.     

LRID = ALRI's district Land Reclamation and Irrigation Division

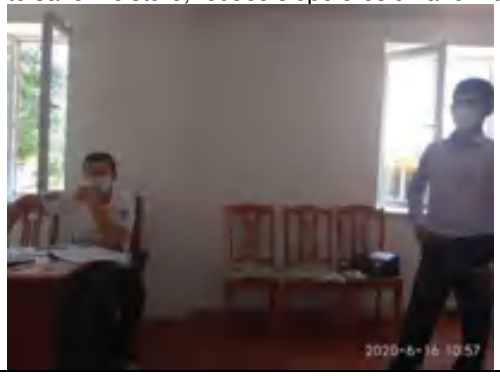
Interviewee No. 4

Name	Head of WUA Support Department– Ergashev Nurullo, Khuroson district (Chief Engineer of the Vodkhoz Sharipov Rahmon 904-99-00-49.
Location	Department for WUA Support of Khuroson District
Date	16 June 2020
Information	Gave a contact for possible getting of information on the geology and composition of soils of the Khuroson district. 

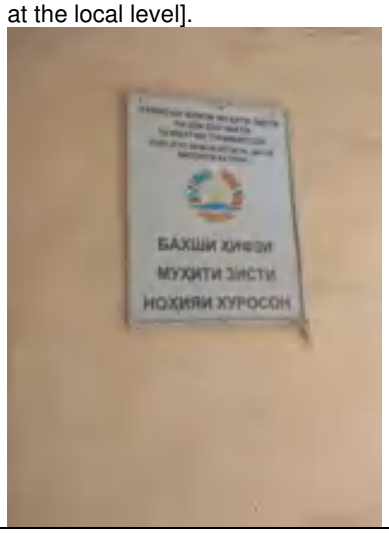
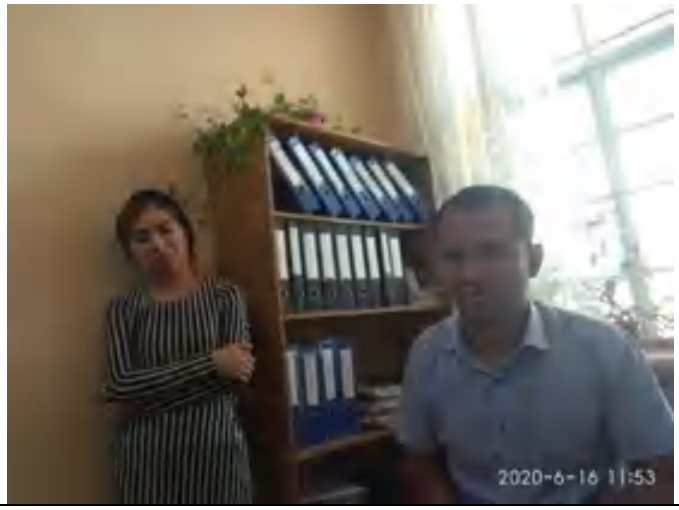
Interviewee No. 5

Name	Zairov Ilhom, 905-77-20-02. Head of the Statistical Office of the Khuroson district
Location	Department of the Statistical Office of the Khuroson region
Date	- Passport of Khuroson district
Information	Provided the passport copy of the Khuroson district. 

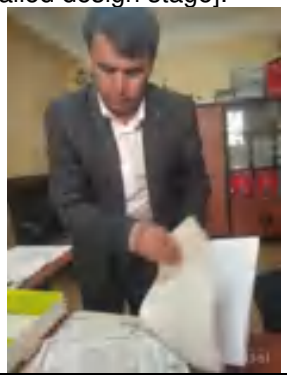
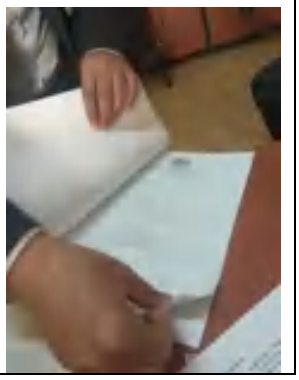
Interviewee No. 6

Name	Officers of the Forestry Department of the Khuroson region – Head was absent
Location	Department of Forestry of the Khuroson district. General information on the state of the environment of the district and actions to reduce soil erosion
Date	16 June 2020
Information	The officers of the department gave some verbal information regarding the flora and fauna of the district, as well as reforestation, planting pistachios, walnuts and almonds on the slopes, which helps to save moisture, reduce slope erosion and increase biodiversity. 

Interviewee No. 7

Name	Saidov Bakhtovar - Chief Specialist of the EP Department –907-67-57-45 Head was absent
Location	Department of EP of the Khuroson district Information not provided
Date	16 June 2020
Information	Promised to prepare information on the flora and fauna of the district, to clarify the species composition and species listed in the Red Book inhabiting the territory of the district, as well as to take information on the geography, geology and composition of soils of the Khuroson district. He promised to send all the information received by e-mail. But the promised information was not received. [After follow up the information was not sent, suggesting that there is very little information at the local level].  

Interviewee No. 8

Name	Specialist of the department (Head on vacation) of state control of the land use and protection and waste management Tel / Fax: (+992) 235-95-74
Location	State Committee for Environmental Protection under the President of the Republic of Tajikistan who gives permission for the removal and disposal of waste
Date	23 April 2021
Information	He said that the CEP issues licenses to the Utilities for waste removal and issues permits for waste disposal. On the burial of asbestos-containing materials: there was only one case of handling the burial of ACM from the Sanktudinskaya HPP, the head of the department owns the information, he is now on vacation. [No further information available. ALRI will further consult with the CEP and determine the disposal site at the detailed design stage].   

Interviewee No. 9

Name	Juraev Abdusalim Shoevich - Head of the Monitoring and Environmental Policy Department Tel / Fax:(+992) 235-47-31
Location	State Committee for Environmental Protection under the President of the Republic of Tajikistan
Date	23 April 2021
Information	As the former head of the department of state control over the use and protection of land and waste management, provided information on landfills for the disposal of hazardous waste in Tajikistan. He

	said that in Tajikistan, ACM is not yet classified as hazardous waste, only radioactive materials, and persistent organic pollutants (pesticides) that are disposed of at special landfills are currently considered hazardous waste. He also talked about the procedure for disposal or temporary placement of ACM materials at ordinary local solid waste landfills. Before removal and placement, or disposal of waste, their volume is determined. A permit is taken for temporary placement, or burial of these wastes in the district departments of environmental protection, the district department of Sanitary and Epidemiological Service is also notified. An agreement is concluded with the head of the local solid waste landfill to establish a temporary placement or disposal site for ACM. The disposal of ACM waste is carried out by a licensed utility company, or by the Project itself under contracts and permits.

Telephone conversations were held with representatives of the republican, city and district Sanitary and Epidemiological Service (SES)

Interviewee No. 10

Name	Karimov Muhamadkul 935-14-42-35 Republican SES
Date	22 April 2021
Information	There are landfills for the disposal of hazardous waste in Tajikistan, but he does not know if the ACM waste is classified as hazardous and where it is taken. He said that there is Union of Soviet Socialist Republics (USSR) GOST standard for asbestos-containing pipes, which contains all the information about the composition and properties of drainage pipes, which were produced in Soviet times only according to GOST standards.

Interviewee No. 11

Name	Shodmonov, 918-82-54-43 SES specialist, Dushanbe
Date	22 April 2021
Information	Said that a new landfill for solid household waste is currently under construction

Interviewee No. 12

Name	Ganiev Arkomidin - Head of the SES Department of the Yovon District
Date	22 April 2021
Information	Hazardous waste is radioactive, and he knows that currently they are buried at the Dushanbe landfill, he is not aware of the ACM waste.

1. The consultative meetings with local government institutions were held at district and jamoat level authority offices. In Yavan, consultations were held in August 2020, in A. Jami, consultations were held in September 2020, and in Khuroson, consultations were held in September 2020.

2. The project scope, works and activities were discussed with the land committee, land reclamation departments and jamoat representatives.

3. In some of these meetings, heads of communities and villages in the project area, as well as WUA representatives, attended and presented the interests of the local communities and farmers who use water to irrigate farms and homestead.

B. Consultation meetings with local government institutions and private sector

4. Local stakeholders noted the positive aspects of the proposed project, for example to alleviate shortages of irrigation water, address drainage problems, safeguard lands and property from mudflows and improve roads. However, a key feature of the consultations was that insufficient data is available concerning the buried pipe condition, and that considerable uncertainty remains about the extent of excavation for pipelines.

5. Discussions and joint visits to the main works sites revealed that project will have little negative impact on communities' lands, structures, assets, and other properties. This is because most of the irrigation system, including the main and distribution canals, and pump stations, were built on government administered barren lands, and within the dehkan farms areas, and sufficient Right-of-Way for maintenance was allocated. These Right-of-Way remains free of encroachers and informal users and is sufficient for modernization under the Project.

6. For the main and right branch canal system and associated structures, the two pump stations, Rassvet #6 and PS #26, secondary canal PL4, and for erosion prevention measures in the riverine area, the proposed modernization works will not lead to any resettlement of households, and residential buildings, agricultural lands and local infrastructure and crops including fruit trees and vineyards, will not be affected. The works will also not pose any threat to the local road and social infrastructure facilities.

7. During conversations with responsible employees of land management and land reclamation departments, representatives of WUAs in the project area stated that functional I&D infrastructure is essential for their livelihoods, and their condition is badly deteriorated. Upgrading and modernization of the system will help improve living standards of rural residents, local entrepreneurs, and farmers. Local residents also noted that one result of quarantine and restricted movements under the Covid-19 epidemic, is the return of migrant labour, and employment for returned migrants, as well as for young farmers and entrepreneurs, may be provided by in the agriculture sector.

Interviewees 12. Consultations with local authorities and private sector

Consultations with local government representatives

Consultation with private sector and dehkan farms representatives

C. Community Public Consultations

8. Three formal public consultations were held in September - October 2020 in Yovon, A. Jami and Khuroson districts. These were held in the jamoats in the project area. In total, in September – October, 105 people were consulted in formal and informal meetings in jamoat offices and/ or in the field.

9. A wide range of stakeholders attended the public consultations, including local government and other relevant jamoat staff, community leaders and residents from their respective communities, WUA representatives, local farmers, regional and district (LRID) ALRI staff including infrastructure manager, engineers, specialists, and national TRTA consultants.

10. The public consultations were aimed at provision of information on: (i) project scope, work, and activities, (ii) the ADB's policies and procedures to avoid, minimize, and mitigate any negative impact, including the grievance redress mechanism, and social and environmental safeguards, as well as the implementation timeframe.

11. Discussions covered potential land acquisition impacts, whether permanent or temporary, among various stakeholder groups.

12. In all public consultations, the main points of inquiry and discussion included: (i) physical works to be implemented, (ii) the expected start date for the project, and (iii) the GRM.

13. Local residents/ beneficiaries expressed their appreciation for the proposed project. They requested that is start as soon as possible as the deteriorated I&D land productivity. The current PIG manager stated that the preparation procedures take time, but that stakeholders will be informed in advance of construction work.

14. Specialists from concerned institutions (ameliorators, jamoat workers, education, and health sector workers) also expressed their gratitude to ADB for the much-needed project.

15. Contractor representatives who have implement similar projects in the region were also invited to the meetings to discuss issues that arose in those projects during implementation. They also suggested solutions and measures that would minimize adverse impact on beneficiaries. Examples included: (i) informing communities of the nature of the works, (ii) informing about any impact on irrigation supplies – timing and volume, (iii) diversion measures, (iv) access to the works sites, and so on.

16. Under the project, the contractors will be required to maintain irrigation supplies in the main vegetative season, not to hinder road access between communities and to farms, and to minimize any negative impacts on lands, properties, and crops.

17. Communities were encouraged to maintain close contact with implementing authorities, and exchange information on any unforeseen violations, inconveniences or issues created by the project due to the contractors works, or any other issue.

D. Consultations with focus on Buried Pipe System

18. For the buried pipe I&D systems, field surveys and inspections over four WUAs had been carried out intermittently from May to December 2020. As part of these surveys local farmers were consulted about the condition, and works required for modernization, of these (pipe) systems. This survey covered the following four WUAs: Chorgul, Norin, Istiqlol 2010 and Shabnam. However, these surveys did not include assessment or discussion of the land acquisition implications of these works.

19. As the social safeguard and due diligence consultations in September – October 2020 did not adequately consider the tertiary level works, additional consultations concerning the I&D pipe systems for the core area of 9,827 ha to be modernized, i.e., command areas of WUAs Chorgul-2012, Norin, Obi Yovon and Istiklol-2010, April 2021.

20. These additional safeguard consultations included site visits and discussions with:

- Head of the Tajik reclamation expedition in Yovon district, Saitov E.
- Director of WUA "Chorgul-2012", Nodirov B.
- Director of WUA "Norin" - Khudoikulov B.
- Director of WUA "Obi Yovon" -Hudoyberdiev B
- Director of WUA "Istiklol-2010" -Eshkuvatov F.
- Representatives of dekhkan farms, farmers and jamoats in these WUAs

21. The additional safeguard consultations concerned the temporary loss of land for work on pipe systems, and areas of crop loss. The numbers of homestead courtyards/ buildings that could be affected if pipelines had to be excavated were also estimated.

22. The consultations also noted that insufficient data is available concerning the buried pipe condition, and that considerable uncertainty remains about the extent of excavation for pipelines.

Interviewees 13: Communities public consultations

Consultation with women's group and men's group in jamoat Dusti of A. Jomi district

Public consultation in Hiloli jamoat of Khuroson district

Public consultation in Gulsara Yusupova jamoat of Yovon district